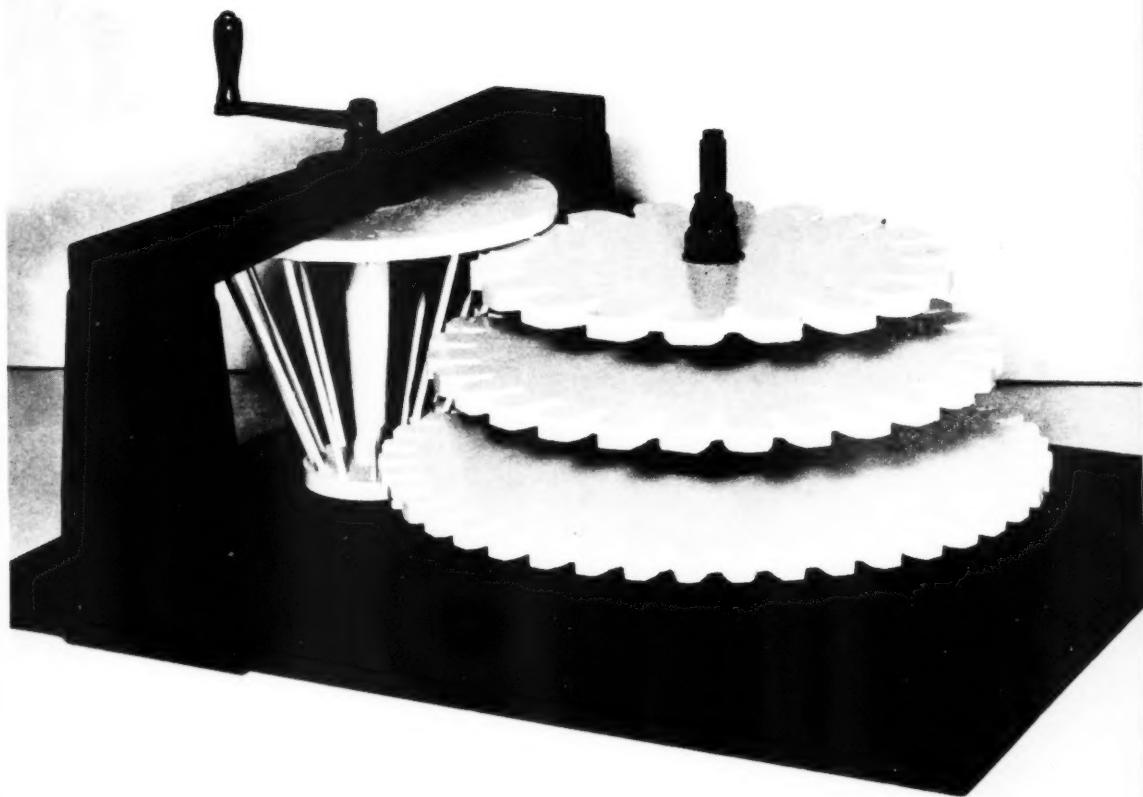


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GENERAL AND EDITORIAL OFFICES
HEADQUARTERS OF
WESTERN SOCIETY OF ENGINEERS
84 E. RANDOLPH STREET
CHICAGO 1, ILLINOIS
TELEPHONE: RA NDOLPH 6-1736

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Serving the Engineering Profession



JANUARY, 1952

PART ONE

Vol. 4, No. 5

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COVER LEGEND

Leonardo da Vinci, the first true engineer in the modern sense of the word, provided the basis of many of our inventions. In commemorating the 500th anniversary of his birth, the MIDWEST ENGINEER plans to publish a series of pictures of models made from his original drawings. Shown on this month's cover is Leonardo da Vinci's variable speed drive. He meshed three cogged wheels of different diameters, with the same lantern wheel, to obtain different speeds of rotation. The idea is found in our modern automobile.



March 12, Wednesday Noon Luncheon Meeting

Ruth H. Perkins, an architect with Bertram A. Weber Co. will discuss the problems of home building. Her topic is, "So You Want To Build a House."

March 15, Excursion

E. T. Baldwin has planned an excursion for WSE members to the Museum of Science and Industry. Members will see special exhibits in the new sciences such as nuclear physics. In addition a special demonstration will be shown in the new Electric Theater. Members are to meet at 10 A.M. at the information desk nearest the main entrance of the museum.

March 17, The Engineer and Atomic Energy

SPONSORED BY THE FIRE PROTECTION AND SAFETY ENGINEERING SECTION

Alfred M. Amorosi, associate director of the Reactor Engineering Division at the Argonne National Laboratories, will present an illustrated discussion on how the many fields of atomic energy can be profitably used by the engineering profession. He will discuss the need of further engineering development to properly apply atomic energy to its many peacetime uses which will open new fields to the engineer. With the aid of slides he will discuss some of the declassified existing reactors and remote control equipment available to industry.

Mr. Amorosi has been associated with the development of atomic energy since 1946. At that time he was loaned from

the Bureau of Ships to both the Oak Ridge Atomic Energy and the Argonne National Laboratories. He has also been instrumental in the development of the nuclear powered submarine.

The program will be preceded by two short films on the "Basic Principles of Radioactivity and Fission" and "A Report on Progress at the Various Atomic Energy Laboratories."

March 19, Wednesday Noon Luncheon Meeting

"Wearing of the Green" will be the timely topic of Howard F. Peckworth. Mr. Peckworth is with Concrete Pipe Associates, Inc.

March 24, The Engineer and His Place in the Community

SPONSORED BY THE MECHANICAL ENGINEERING SECTION

Alderman Robert E. Merriam of the 5th Ward, speaker for the evening, is fast becoming a leader in Chicago politics. Chairman of the City Council Commission on Housing and a member of the City Council Crime Commission, Ald. Merriam has made a special study of the problems of neighborhood conservation. He has been very active in urging further progress in the re-development and public housing program in Chicago.

March 26, Wednesday Noon Luncheon Meeting

George M. O'Rourke, assistant engineer in the Maintenance of Way Department for the Illinois Central Railroad, will speak on "The Federal Railroads of Western Germany Five Years After the Collapse of the German Army."

March 31, My Experiences in the Persian Gulf Command

SPONSORED BY THE TRANSPORTATION ENGINEERING SECTION

Alfred Benesch, head of Alfred Benesch & Associates, Consulting Engineers, will discuss the problems of transporting army equipment through the Persian deserts. Mr. Benesch spent about two years in that country while he was an officer in the Persian Gulf Command of the United States Army. Prior to his entry in the service, Mr. Benesch was a grade separation engineer with the Illinois Department of Highways.

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ELECTRICAL EQUIPMENT IN STEEL MILLS

by W. B. FERGUSON,
Electrical Engineer
Frey Engineering
Department of
Koppers Company, Inc.

Describing an imaginary tour through a steel mill, Mr. Ferguson explains the intricate working of its electrical system.

To those of us who are, or have been associated with the steel industry for a good many years, the fact that steel mills for the most part are electrified is common knowledge. To those less closely associated with steel it may be somewhat of a surprise to know that the steel industry is not only almost entirely electrified, but is one of the largest users of electric power in the United States, being second only to the electrochemical industry.

During the year 1949, which is the last year for which a complete report is available, the total power consumption for the United States was 291,000,000,000 kw hours. During this same period, all industry used a total of 120,765,000,000 kw hours. The steel industry, as singled out from the industrial load, used a total of 19,701,000,000 kw hours (8,124,000,000, generated; 11,577,000,000, purchased).

This tremendous use of power is not the result of an extensive and rapid growth of steel mills. Rather, the steel mills' rapid and extensive growth is the result of the availability of power in vast blocks, and at voltages and frequencies which lend themselves to the requirements of the mills.

It would be difficult for us to picture the steel industry without electricity. It is one of those items which go to make up our daily lives, and for the most part

we accept it without question or concern.

Sometimes it would appear unfortunate that our electrical systems and equipments are so well developed and so commonplace. The electrical system within a steel mill does not receive its just and proper position in that industry, as in others, for the simple reason that, for the most part, the feeder system is buried and completely out of sight, the control for the various drives is located in out of the way, obscure, control houses, and the drives themselves are so silent that they command no attention. Therefore, the entire electrical system is relegated to a position of obscurity unless the electrical engineer for the mill is on his toes and is not afraid to speak up and assert himself.

Let us take a walk around our modern integrated steel mill and see where all these kilowatt hours go.

As we begin our journey through the steel mill, we will start with the flow of raw material into the plant. In this manner we will follow the progress of the material through the mill from department to department.

As we approach the ore docks, we are immediately impressed with the ore bridges and unloading equipment. The unloaders, such as we find in the Chicago area, take the form of Heulets or bridge type unloaders. Towering above

the unloaders are the ore bridges, which handle the ore and stone from the pocket where these elements are deposited by the unloaders as they empty the transport boats.

Devices such as the unloaders and ore bridges are rapidly reversing units with a fairly high load factor. Direct current is best adapted to this type of unit for it is more readily controlled in graduated steps, or is continuously adjustable as in some recent installations. The torque requirements of such devices are very high. The hoists are often called upon to lift great overloads at extremely high speeds.

Proceeding through the blast furnace department, we encounter other such requirements, the ore transfer cars, the scale cars, which operate in the area below the ore and coke bins of the blast furnaces proper. The ore and stone, having been unloaded into the pocket by the unloaders, is moved to the ore storage yard to be stored, mixed, or handled in some fashion by the ore bridges. Again the ore bridges pick up the ore and load the transfer cars, which dump it from the high line level into storage bins over the scale cars. The scale cars then take the stone or ore from the several bins in weighed amounts, dumping their loads into the skip cars for transfer to the top of the blast furnaces

proper. In the blast furnaces, the ore is reduced for the making of pig iron, or for direct use as hot metal in the open hearth, electric furnace, or Bessemer shops.

To get the several thousand kw capacity of direct current required for the blast furnace area, it is necessary to locate suitable substations convenient to the equipment. These conversion units may take the form of M. G. sets or they may be some type of rectifiers. It is probably advantageous to make use of at least two conversion substations in a typical blast furnace plant which has a conventional ore dock extending two, three or more thousand feet in length. As you may well imagine, the feeder cables required to supply 250 volts D. C. to all portions of the main dock collectors without excessive voltage drop would be quite heavy.

Perhaps we should point out that a modern ore bridge would have four 75 horse power motors driving the pier legs, the trolley would be driven by four 100 horse power motors imparting a speed of 900 feet per minute, and the two motor hoists would be driven by two 350 horse power motors—a total of 1,400 horse power for each bridge. There may be two or four bridges, depending on the length of the dock. The unloaders represent similar loads.

Dock Requirements

The transfer and scale cars, and the skip hoists combined with other segments of D. C. load about the blast furnace also add up to a fair load, but one which does not compare with the dock load. As a matter of fact, the power requirement for the furnace area proper—made up of skip hoists, cast house cranes, slag pit cranes, mud guns, distributors and so on—easily fits into the valleys of the dock power requirements, creating in effect a better load factor without boosting the necessity of additional power capacity.

The ability of the rectifier to handle 200 per cent load peaks makes such conversion equipment very desirable for such loads as are encountered in the dock area. The fact that the rectifier will not absorb reverse power feeds sometimes precludes its use as a power source for loads which do feed back such as series parallel skip hoists, where some regenerative braking is required. The rectifiers inability to correct power

factor is another feature which should always be considered in a steel mill, especially where large A. C. motor drives are the rule.

Motor generator sets do not reflect A. C. voltage fluctuations into the D. C. as do rectifiers. This is particularly true of a synchronous motor driven M. G. set. We should not lose sight of the fact that a synchronous motor's torque varies as the voltage whereas an induction motor's torque varies as the square of the voltage. This fact sometimes plays an important part in the selection of the drive motor.

The alternating current equipment for the blast furnace area would be housed in the same substation as the conversion equipment. Since the switchgear are for the most part metal clad, draw out type of breakers, the leaning is toward air breakers rather than oil. The transformers may be air cooled, located in the substation and forming part of the switchgear physically in a symmetrical arrangement. The transformers may be Askarel cooled, again forming part of the switch gear line up. Or they may be OISC type units, located external to the building.

Primary voltages found in most blast furnace areas are 13.8, 6.9 or 2.3 kw, depending on the size and age of the plant, with the trend in more modern plants running toward the higher voltages.

It is becoming more common to locate load centers at, or as close as possible to the point of usage. It is quite practical to remotely control an entire substation with complete A. C. distribution, rectification and D. C. distribution. The sealed tube type rectifier unit has gone a long way toward eliminating the feeling that an attendant is necessary at a station.

When rotating type conversion equipment was the predominant system, the practice was always to have station attendants. For the most part these men were strictly overhead, as very little was done in the way of maintenance or repairs during operation periods.

In modern plants it is necessary to have attendants at points of generation. Usually the system operator or load dispatcher is located at the main generation point. Thus our distribution substations may be unattended and even pilot wire controlled if we wish to carry the system to perfection.

We have discussed the D. C. drive applications in the blast furnace area. The remaining drives, which are integrators, pumps, fans, blowers, conveyors, vibrators, thickeners, and the many little loads such as the instruments and lights, rightly belong on A. C. as the motors are constant speed.

The prime requirement of the power, whether it is D. C. or A. C. in the blast furnace area, is reliability. Some plants go to considerable trouble and expense to insure an adequate supply of power.

Substations

To serve a six furnace plant in the Chicago area, two substations were laid out. The primary power was looped through the two substations, each feed coming from a separate bus. One substation was located near each end of the blast furnace line. From each substation three furnaces were fed in two separate loop feeds, both of which were pilot wire controlled.

The ore yard paralleled the furnaces on this job. One substation was located near one end of the ore dock and the other near the mid-point of the ore yard. Thus the feeder system was split and lengths kept to a minimum.

It was decided to have one rectifier unit in the substation located at the mid-point of the ore yard operate on base load normally. The second unit responded to load control and would come on or go off the line as the location of the ore bridges and unloaders disturbed the voltage regulation.

Another feature which tends toward reliability without increasing the cost of equipment is the arrangement of the feed to the skip hoist. Some plants use a motor generator set as a source of power for the skip hoist. This set is made up of a synchronous drive motor and two generators with, of course, necessary excitation. Normally one generator could carry the skip hoist drive. The second generator may supply power to the 250 volt mill system or it may run as excess baggage. It also is available to serve as a drive motor in case of A. C. motor failure.

The motor generator set in this case is a simple unit one A. C. motor, one D. C. motor generator, and an excitor of sufficient capacity to carry the excitation, the skip hoist control, the charge con-

(Continued on Page 20)

WANTED—ENGINEERS

By WILLIS F. THOMPSON*

Mr. Thompson is chairman of the National Guidance Committee of the Engineers' Council for Professional Development and vice president of Westcott and Mapes, Inc., New Haven, Conn.

Since the beginning of the Korean war, nearly every newspaper has been carrying help wanted advertisements for engineers in their columns. The shortage of engineers becomes greater with each passing month and has now reached a stage much more critical to the defense effort of the nation than is the shortage of carbon steel, structural steel, alloy steel, stainless steel, copper, copper base alloys and aluminum. With the increased spending for armaments which will now occur due to recent acts of Congress, we can anticipate an engineering manpower shortage the severity of which will have no previous equal in any nation and which may easily result in a perceptible change to our social order.

There are now well over 400,000 engineers employed in all branches of the profession and, using conservative figures, we are now short well over 95,000 engineers. The demand for engineering graduates every year in the foreseeable future is placed at not less than 40,000 and reliable data indicates the demand is close to 45,000 and, mind you, this is after 52,000 engineers were graduated in 1950, the largest class ever to graduate, and 38,000 were graduated this year. These engineering graduates were immediately absorbed and the smaller class of 1952, which numbers about 25,000 will all be promised long before graduation day. The 1953 class, on the basis of present enrollments, will be a scant 19,000 and the 1954 class is expected to be even lower. Local draft boards may al-

ready have drafted a sufficient number of young men for the military service who are technically inclined to reduce the number of graduates to an insignificant low in 1955.

The present demand for engineers is not due entirely to our defense effort. At least 30,000 engineers each year are needed in this country for normal replacements and growth. The military services take in the order of another 15,000 engineers annually. Industrial research and development have increased more than 500% since the beginning of World War II while the number of scientists and engineers has barely doubled. To this demand there must, of course, be added the large number of scientists and engineers in government research.

From the best information obtainable at present, Russia is now producing 30,000 graduate engineers a year from universities and 70,000 graduates from technical institutions. It should therefore be apparent to everyone in the engineering profession that, insofar as guidance work is concerned, we are very much behind schedule and every effort possible must be expended to keep the "pipe line" filled through which technical personnel are educated and developed.

I am not at all satisfied that industry is now using engineers efficiently. An engineer's training makes him easily adaptable to non-engineering positions in industry and many are now so engaged. Proper utilization of engineers in industry is now absolutely necessary if

we are to make our maximum contribution to the nation.

It is unfortunate that it was necessary for so many engineers, both experienced and otherwise, during the 1930's to accept non-engineering positions to earn a livelihood. Many of these men are lost forever to the profession and this displacement, I believe, is one of the principal causes of our present shortage of engineers.

It is inevitable, therefore, that the shortage of engineers will create unparalleled opportunities for both men and women entering engineering study during at least the next ten years. I have been informed that one large electrical manufacturing concern announced lately it was planning to recruit 500 women college graduates in engineering, sciences and mathematics to help the engineering trained men in its organization. As the shortage of qualified men becomes more acute, the opportunities of qualified women in engineering becomes greater than ever before. Many young women with an aptitude for mathematics, the physical sciences and English have become very successful in engineering.

Considering the United States as a whole, the average engineer is in the same earning class as the physician and the lawyer. Like them, his earnings vary widely with his ability and with business conditions as a whole, being significantly higher during booms and much lower during depressions. The median earnings for beginners, that is, those who have

just been granted their college degrees, is now about \$3,750 per year. The median earnings of engineers with 25 years of practice is now near \$8,000 per year. The earnings of those who remain in the strictly technical brackets is less than those who take on administrative duties. There is, as in every other profession, a minority who lack the drive, or the teamwork personality to achieve high earnings and, at the other end of the scale, there is a minority embracing those who reach \$15,000 or more about 20 or 25 years after graduation.

As in all careers, and especially in the professions, the rewards of engineering may be regarded as coming from several sources, such as:

- (a) Personal satisfaction with the actual activity of the occupation
- (b) Social satisfaction because of the usefulness of the services rendered
- (c) Financial satisfaction arising from the earnings received.

ECPD and Its Objectives Through Student Guidance

I think it would not be remiss at this time to review what ECPD is all about. Back in October 1932, ECPD was organized for the purpose of promoting the welfare of individual engineers. During the early 30's a great need existed for a joint program by all of the engineering societies for the purpose of creating more respect for engineering as a profession and at the same time establishing a recognized procedure for certification. ECPD has now been in action for nearly twenty years and, although its work will never be finished, its accomplishments to date have benefited the engineering profession greatly.

Probably the most conspicuous of ECPD's accomplishments is its program of accrediting engineering curricula which has been conducted by its Education Committee. As of October 1949 some 991 curricula had been inspected, evaluated and 734 accredited at 146 degree granting institutions in the United States. Twenty-five curricula had been accredited at 13 technical institutes in an initial extension of the accrediting program to this type of training.

Like any other organization, ECPD must depend upon the efforts of individual members of its engineering societies affiliates who are interested in and have become familiar with its objectives. These objectives are: to coordinate and

promote efforts to attain higher professional standards of education and practice, greater solidarity of the engineering profession, and greater effectiveness in dealing with technical, economic and social problems.

ECPD is not an independent body but derives financial support and its administrative personnel from its constituent organizations.

One of the basic ECPD concepts is that there are four normal stages in the life of the engineer and the profession as a whole must recognize that it has a responsibility in each stage as the engineer advances through life. The four stages are:

1. The pre-college stage
2. The undergraduate stage
3. The engineer-in-training stage
4. The stage of full professional practice

The Guidance Committee of ECPD is interested in the first, or the pre-college stage and we concern ourselves mostly with students at the secondary school level who are qualified to enter the engineering profession. It is our purpose to provide these students with a means for educational and vocational orientation with respect to the opportunities and responsibilities of the profession. Our most important work is to assure that only those having the personal qualities, aptitudes and capacities required of engineers will seek entrance to the profession through engineering schools. The Committee's objectives, as set forth in ECPD's Charter and Rules of Procedure are as follows:

"The Guidance Committee shall develop, and review regularly, methods for guiding young men who seek entrance to the engineering schools so that those who enter will have the high quality, aptitude, and capacity required of engineers in the particular branches of engineering that they select. The Committee shall develop, and modify when necessary, an active program of cooperation with engineering and other groups so that the guidance methods developed will put to useful purpose. The Committee shall report annually what response has been received to its program."

The attainment of the Committee's principal objectives involves,

1. "The supplying of information to each student or potential student concerning the qualifications essential for success in the profession of engineering.
2. "Continuing assistance to the vari-

ous local engineering groups and their agencies which guide high school students in the selection of first year college curriculum.

3. "Stipulation of a more active participation of the local organization of ECPD constituent societies in the active promotion of ECPD objectives at the community level."

How The ECPD Guidance Committee Functions

The National ECPD Guidance Committee at present, is composed of eleven members. The United States has been sub-divided into eight regions, each of which has a regional chairman who is a member of the Guidance Committee. The regions are as follows:

Region I:	New England
Region II:	New York and New Jersey
Region III:	Pennsylvania, Maryland, Delaware, Dist. of Columbia
Region IV:	Virginia, North Carolina, South Carolina, Tennessee, Mississippi, Alabama, Georgia, Florida
Region V:	Michigan, Indiana, Ohio, Kentucky, West Virginia
Region VI:	North Dakota, South Dakota, Nebraska, Wisconsin, Minnesota, Iowa, Michigan, Illinois
Region VII:	Oregon, Washington, California, Nevada, Idaho, Utah, Arizona
Region VIII:	Wyoming, Colorado, New Mexico, Kansas, Oklahoma, Texas, Arkansas, Louisiana

Canada will also be subdivided into regions. The boundaries of each region will be that of a province. It is expected that Alaska and Hawaii will each be one region.

Every state in each region in the United States will have a state chairman who will be selected by the regional Guidance Chairman. The state chairmen, in turn, will select their county, city and town chairmen. The National Guidance Committee has no intention of interfering with local procedure or autonomy and the national network will disseminate information as to guidance methods used in various localities which seem to have advantage and which other localities may wish to adopt after trial.

We believe that the work of guidance can best be accomplished by having regional and state guidance committees

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come under the leadership of ECPD. The ECPD Guidance Committee is recommending to its Regional Chairmen:

1. State and local forums for discussion of improved methods of procedure.
2. The exchange of ideas as to how best to obtain the cooperation of boards of education and high school principals.
3. Organization of a speakers bureau which will cover completely the field of engineering, at least, civil, electrical, mechanical, mining and chemical engineering.
4. The accumulation of lists of publications now available to aid those engineers who volunteer to engage in this valuable contribution to industry, to the profession, and to the coming generation of American citizens.

Recently the Engineering Manpower Commission of the Engineers' Joint Council has contacted by mail some 23,000 high school principals, sending each a copy of our booklet "Engineering As a Career" and we are requesting our regional and state organizations to follow up these contacts as soon as possible.

The Engineers' Joint Council recently scheduled a full scale meeting of engineers from various societies throughout the United States in Pittsburgh. At that meeting facts about shortages of engineers were discussed in detail and the delegates were urged to set up or assist in local programs to counteract the shortage. Recent action by Charles E. Wilson, Defense Mobilizer, in setting up a commission for specialized manpower, headed by Dr. Arthur Fleming, may help in solving some of the problems concerning the manpower shortage. The Engineers' Joint Council has suggested to Dr. Fleming that steps should be taken in halting the employment of engineers in positions that do not have to be filled by technical men in both industry and the armed forces. The Council further implored the new commission not to shut off the flow of students to engineering colleges in the attempt to maintain an army of 3,500,000 men.

The flow of high school graduates to engineering colleges and technical schools would with our present guidance organization, be maintained except for interference by the selective service system, which seems disposed to commit all the errors of World War II again.

The Engineering Manpower Commission and other interested groups are urging deferment of an adequate number of college students in engineering and science at undergraduate and advanced levels. A bill was introduced in Congress to make this deferment mandatory but it failed to be enacted into law. All deferments are therefore acted upon at the local level.

Students and Counselors

It should be remembered by all persons interested in student guidance work that high school graduating classes are now composed of boys and girls who were born in the depression of the early 1930's. Many of their parents have lived on relief and their children have been exposed to a philosophy of life quite foreign to the system of government under which we received our elementary education.

High school counselors are found to be usually part of the faculty and in many instances have between 200 and 300 students to counsel not only in engineering but also in other professions and vocations. In a good many instances, these counselors have the dual job of acting both as parent and counselor and it is well known to all of us who have been interested in guidance in the past how difficult it is for boys and girls who have not had proper guidance from their parents.

It should be mentioned at this time that, while we live under a war and peace economy, high school teachers who are good counselors and reside in industrial areas are exposed to the lure of higher salaries offered by industrial concerns who are continuously in the market for trained men in the field of personnel work. Many good high school teachers and counselors were lost to industry during World War II and the same thing is happening now. Counselors who are part of the high school faculty must not only maintain their home room discipline but, in some instances, teach as many as one half dozen or more classes per day.

Those of us who are interested in guidance and have been in direct contact with boys and girls of the present high school age, cannot help but have been impressed not only with their high level of intelligence but also with their sincere and earnest desire to become good citizens. It is the speaker's opinion

that, at no time in our country's history, have we, on the average, produced better high school students in spite of the time and circumstances under which we now live.

What Aptitudes Are Required?

The best prospect for successfully completing the engineering college course is the industrious high school student who shows:

1. Ability to get along well with his fellow students,
2. Scholastic proficiency, particularly in mathematics, the physical sciences and in English.

Students who score in the top third of their class on standardized tests in mathematics and physical sciences should be encouraged to follow the strongest sequence of English mathematics and the science courses available to them. In this way, they can best prepare themselves for entrance to the engineering college of their choice.

Aptitude tests which are considered to be especially useful for seventh through twelfth grade students are available through the Cooperative Division, Educational Testing Service, 20 Nassau Street, Princeton, N.J. These tests, now being used in several areas, are achievement tests in mathematics, physical science, and in English and have been found repeatedly to yield good predictions of scholastic success in engineering.

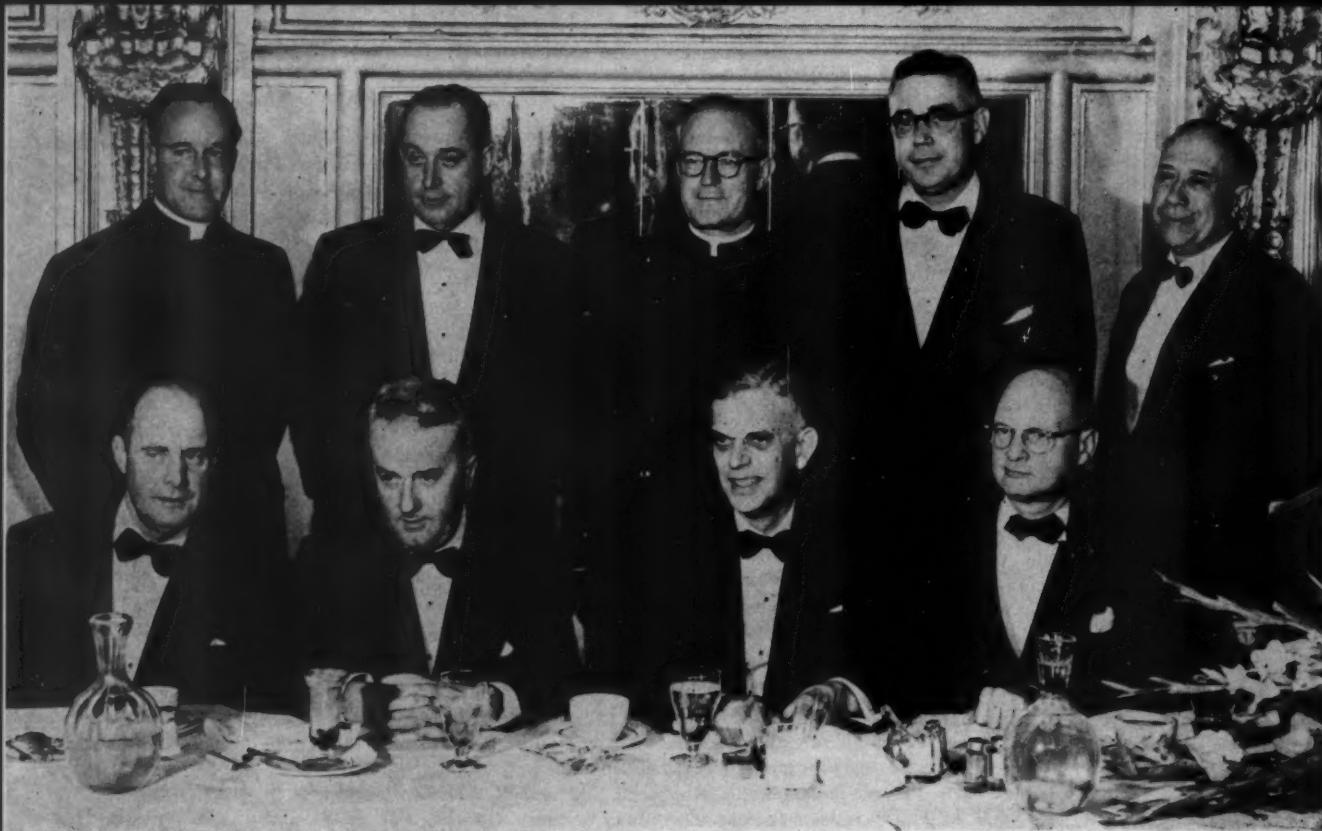
In many engineering colleges a mathematics test of the appropriate level has provided better prediction for entering freshmen than a scholastic aptitude test. A scholastic aptitude test often predicts about as accurately as do secondary school grades.

Recommendations

Following are 10 suggestions which should help reduce the shortage of engineers in the future.

1. Give every assistance to your ECPD State Chairman in organizing guidance committees.
2. All ECPD State Chairmen should notify the Selective Service authorities in their states that guidance committees are available to every draft board for consultation regarding deferment of technically inclined high school students.

(Continued on Page 26)



College presidents honoring Dr. Henry T. Heald were: (Left to right, front) Herold Hunt, superintendent of city schools; Dr. J. Roscoe Miller, Northwestern; Dr. Heald, and Dr. George D. Stoddard, Illinois. Back: The Very Rev. Comerford J. O'Malley, De Paul; Dr. Edward Sparling, Roosevelt; The Very Rev. J. T. Hussey, Loyola; Dr. Lawrence A. Kimpton, Chicago, and Dr. H. C. Coffman, George Williams.

HENRY T. HEALD Testimonial Dinner

Henry T. Heald, past president of the Western Society of Engineers and an honorary member was honored at a farewell dinner on January 21 at the Sherman Hotel. Dr. Heald is resigning as president of the Illinois Institute of Technology to become chancellor of New York University.

The dinner, sponsored by Chicago's engineering societies, civic groups, IIT alumni and industry in this area, brought together 700 leaders in the community. It also brought together for the first time, at a speaker's table, all the

presidents of the universities in the Chicago area. The nine leaders in the educational field were: Dr. Heald; Dr. J. Roscoe Miller, Northwestern University; Dr. Lawrence A. Kimpton of the University of Chicago; Dr. George D. Stoddard, University of Illinois; The Very Rev. Comerford O'Malley, De Paul University; The Very Rev. J. T. Hussey, Loyola University; Dr. Edward Sparling of Roosevelt College; Dr. H. C. Coffman, George Williams College, and Herold Hunt, superintendent of city schools.

James D. Cunningham (WSE), presi-

dent of Republic Flow Meters Co., and chairman of the board of trustees of IIT, was toastmaster.

Speakers included Dr. J. Roscoe Miller, John Holmes, president of Swift & Co.; William V. Kahler, president of the Illinois Bell Telephone Co.; and Guy Reed, president of the Association of Commerce and Industry.

The speakers covered the four facets of Dr. Heald's career in Chicago. Mr. Kahler spoke on Dr. Heald, the engineer; Mr. Holmes paid tribute to Dr.

(Continued on Page 10)

VIEWS OF THE SPEAKERS' TABLE AT THE HEALD BANQUET



Left to right: J. Earl Harrington, chairman of the dinner committee; F. W. Edwards, General Manager of the Centennial of Engineering; D. N. Becker, president of WSE; Titus LeClair, past national president of AIEE; Dr. Donald Bergman, chairman of Chicago Section of ASME; A. L. R. Sanders, immediate past president of the Chicago Chapter of ASCE; Grant J. Pick of Michael Reese Hospital.



Left to right: L. Morgan Yost, president of Chicago Chapter of AIA; E. O. Griffenhagen, president of IIT Alumni Assoc.; Harold Vagborg, president of the Southwest Research Inst.; Herold Hunt, superintendent of city schools; Dr. E. J. Sparling, president of Roosevelt College.



Left to right: Chancellor L. A. Kimpton of the University of Chicago; Major Lenox Lohr, president of the Museum of Science and Industry; The Very Rev. Comerford O'Malley, president of De Paul; John Holmes, president of Swift and Co.; Dr. J. Roscoe Miller, president of Northwestern; William V. Kahler, president of Illinois Bell Telephone, and Dr. Heald.



Left to right: James A. Cunningham, president of the board of trustees of IIT; Dr. Kenneth Hildebrand, pastor of Central Church of Chicago; Guy E. Reed, president of the Chicago Association of Commerce and Industry; Dr. George Stoddard, president of the University of Illinois; The Very Rev. J. T. Hussey, president of Loyola University.



Left to right: Dr. H. C. Coffman, president of George Williams College; Edmund F. Mansure, Illinois Manufacturers' Association; Dr. L. E. Grinter, American Society for Engineering Education; Dr. Haldon A. Leedy, director of the Armour Research Foundation; Dr. W. E. Mahin, American Inst. of Mining and Metallurgical Engineering.



Left to right: LeRoy Clardy, chairman of Chicago Section of Inst. of Radio Engineers; John Ahern, Society of Fire Protection Engineers; Col. J. K. Tully, president of the Chicago Section of SAME; Leslie Sorenson, Institute of Traffic Engineers, and W. R. Marston, secretary of the dinner committee.

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Heald's contribution to industry. Mr. Reed praised him as a civic leader and Dr. Miller eulogized Dr. Heald as a great educator.

Dr. Heald expressed his thanks for the many kind words and for the cooperation he received during the years he spent in Chicago. He appealed for an appreciation of the need for preserving privately endowed public institutions. He stressed the necessity for a continuing partnership between education and industry if we are to preserve our system of free enterprise.

Mr. Kahler, in his remarks on Dr. Heald the engineer, said: "Henry Heald's real work has not been in building things. I guess it's been more like building people and communities and institutions and character. Yes, some engineers can point to an aqueduct, an office building, a fort or a factory and say, 'I built that!' But our honored guest can point to the Illinois Institute of Technology and to Armour Research Foundation. He can point to thousands of splendid young engineering graduates—he can point to a vast and cleaner area of Chicago's south side and he can say, 'These things I have helped to build.' If a phrase might be coined, these are Henry Heald's products of applied 'humaneering' and citizeneering."

The ever-broadening campus of Illinois Institute is the engineering memorial to his years of fruitful effort. Invaluable support for campaigns to abate noise and smoke in Chicago—to clear slums on the south side—are this engineer's legacy to the city which owes him so much."

Industrial Achievements

President Holmes of Swift & Co. spoke of Dr. Heald's contributions to industry. Excerpts from his speech follow:

"Henry Heald has made great contributions to education, engineering and civic affairs. In addition to all this, and of greatest interest to me as an industrialist, has been the prominent place he has taken in the industrial life of the community.

"His firm belief in the fundamentals of our free, competitive society has given him a realistic approach to the increasing problems in our complex economic system. As a spokesman for private development of technological re-

search and for industry-education cooperation, Dr. Heald has underscored the fundamental that has made our country and our economy great; namely, the belief that success in industry depends on the ability of the individual firm to render services efficiently and effectively.

"The private company, like any individual, can progress only in line with its ability to use its knowledge and resourcefulness. In keeping with this precept, a scientist and educator with broad, general understanding of the benefits of research and with knowledge of the proper method of organization to use efficiently the most modern production techniques is of great value to a private enterprise.

Dr. Heald's presence on several corporation boards has another benefit. The thought has often been expressed that too many of our educators live in a world which is theoretical and abstract and insulated from the practical problems of life. Our guest of the evening, in his administration of the Illinois Institute of Technology, has evolved a line of communication between the "ivory tower" and the wheels of industry.

"There is a refreshing undercurrent that runs through all of Dr. Heald's industrial activities—the strong conviction that business and education can most effectively do their jobs in what he terms 'a free partnership of science, education and industry'."

Heald the Educator

Dr. Miller, in speaking of Henry Heald as a great educator, traced the development of IIT under his guidance.—"In 1940 he presided at the birth of the Illinois Institute of Technology, arranging the merger of the Armour and Lewis Institutes. These two institutes had given the city of Chicago long and useful services. But there was little in the fact of their consolidation to stir the public imagination. Their facilities were old, and the site chosen for the campus of the re-born institute was probably the least attractive in the city. It required tremendous courage and vision to conceive of a flourishing development arising amid the dilapidation of one of Chicago's worst slum areas.

"Dr. Heald not only had such

vision and courage; he and his colleagues were able to communicate their dreams to others. In an astonishingly short time, they secured the support needed to begin the development of one of the most modern campuses in the world. And in doing so, they reversed the trend toward disintegration of the central south side. Slum clearance and housing projects are replacing decay and blight in the area around Illinois Tech's rapidly growing campus.

Developments at IIT

"The development of the curricula at the school during the past 12 years has been in the direction of greater emphasis on fundamental science and on general education. The place of the humanities has been strengthened in the undergraduate curricula. The Institute has carried forward striking innovations which have contributed immeasurably to both the material and the cultural welfare of our community and our nation. For example, the Institute for Psychological Service, established in 1945, has supplied industry and the public with testing and counseling service. The program in food engineering has opened a new area of teaching and research. The Department of Architecture and the Institute of Design have carried forward significant currents of modern design and architecture.

"A composite picture of Henry T. Heald as an educator shows a man of exceptionally wide capacities and interests; a man who can both plan and act; a man esteemed by his professional colleagues and by the general public alike; a man who understands the need for specialized education, but who realized that we cannot afford to produce specialists at the cost of sacrificing a broad general education for citizenship; a man who upholds teaching and research as the heart of any educational institution worthy of the name, and a leader who is personally self-effacing."

J. Earl Harrington, executive secretary, was chairman of the committee that arranged the testimonial dinner. W. E. Marston, representing the Institute of Traffic Engineers, was secretary of the committee. They were assisted by a committee composed of the presidents or chairmen of local sections, of the various engineering societies, as well as the chairmen of other sponsoring groups.

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Dr. John Theodore Rettaliata, 40, vice president and dean of engineering at Illinois Institute of Technology, has been named president of the Institute.

Dr. Rettaliata assumed his new duties February 4. He succeeds Dr. Henry T. Heald, who left Chicago after the Institute's mid-year commencement February 2 to become chancellor of New York University.

James D. Cunningham, chairman of the board of trustees of the Institute and president of Republic Flow Meters Company, announced Dr. Rettaliata's appointment on January 28.

Dr. Rettaliata also was appointed president of two other organizations on the Illinois Tech campus—Armour Research Foundation of Illinois Institute of Technology and the Institute of Gas Technology.

Dr. Rettaliata has been vice president in charge of academic affairs at the Institute since October 11, 1950. He has been dean of engineering since September 1, 1948. He joined the Illinois Tech staff in 1945 as director of the department of mechanical engineering.

A nationally known expert on steam and gas turbines and jet propulsion, he has devoted a part of his time since last July as associate director of a high priority classified Air Force research project at the University of Chicago.

Dr. Rettaliata is a vice president of the American Society of Mechanical Engineers. He has written scores of technical articles and papers on engineering subjects and has spoken throughout the nation on engineering and educational subjects.

A native of Baltimore, Maryland, he was born August 18, 1911. He received his Bachelor of Engineering degree in 1932 from the Johns Hopkins University and his Doctor of Engineering degree in 1936 from the same institution. As a graduate student, he was an instructor in mathematics and later head of the mathematics department and engineering instructor at the Baltimore College Center. He also worked in the U. S. Department of Agriculture as a laboratory technician, testing domestic oil burners and bottled gas equipment in 1935.

In 1936, he joined the Allis-Chalmers,



Dr. Rettaliata

Company, Milwaukee, Wis., as head of the calculation and development division of the steam turbine department. He was named manager in 1944 of the then new research and gas turbine development division of the steam turbine department.

During the summer of 1940, he was given a leave from Allis-Chalmers to study special applications of gas turbines on a fellowship awarded him by the National Academy of Science.

In 1941, Dr. Rettaliata received the junior award of the American Society of Mechanical Engineers for his paper on the "Combustion Gas Turbine." A year later he received the highest award obtainable by a young mechanical engineer, the Pi Tau Sigma gold medal award, for outstanding achievement.

During World War II, he twice visited the European theater of operations at the invitation of the U. S. Navy. In 1943 he studied British developments in jet propulsion for the Bureau of Aeronautics. In 1945, shortly before and immediately after the surrender of the Germans, he investigated steam turbines developed by Germany for hydrogen peroxide submarine operations.

The steam turbine had never before been used for underwater navigation, and, as a direct result of Dr. Rettaliata's study, complete technical information on this type of turbine was made available to American manufacturers. For this work, the Bureau of Ships awarded

him a special certificate of commendation.

In 1944 he was named to the subcommittee on turbines established by the committee on power plants for aircraft of the National Advisory Committee for Aeronautics. In December, 1951, Dr. Rettaliata received a special award for "pioneering work in gas turbine development" from the American Society of Mechanical Engineers.

He is past chairman of the gas turbine power division of the American Society of Mechanical Engineers and a member of the American Society of Engineering Education, American Society of Naval Engineers, Sigma Xi, Tau Beta Pi, Tau Omega, and an honorary member of Pi Tau Sigma.

Dr. and Mrs. Rettaliata and their three children, Brian, 8, Stephen, 4, and Patricia, 1, live at 9712 South Winchester avenue, Chicago.

A 14-man presidential nomination committee of 10 trustees and four staff members recommended Dr. Rettaliata's appointment. The committee was headed by John F. P. Farrar, president of the Flexonics Corporation. Other members were:

Trustees—Alex D. Bailey; William V. Kahler, president, Illinois Bell Telephone Company; Harris Perlstein, president, Pabst Brewing Company; Wilfred Sykes, chairman, executive committee, Inland Steel Company; Newton C. Farr, Farr and Company; Lester Armour, chairman of the board, Chicago National Bank; Benjamin Wham, of Wham, Welch, Sprecher & McKee; John T. Beatty, president, United Specialties Company, and Frank A. Hecht, of Hecht Properties.

Staff members—R. A. Budenholzer, professor of mechanical engineering and past chairman, Illinois Tech Faculty Council; E. H. Schulz, manager, physics and electrical engineering division, Armour Research Foundation; H. C. Spencer, director of the department of technical drawing and president, Faculty Club, and L. R. Wilcox, associate professor of mathematics and chairman, Faculty Council.

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* Don't Forget Those Who Work Behind The Scenes

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RESULTS
HAVE BEEN GOOD

LINE SUPERVISION

A New Approach to Control of Rapid Transit Train Service

By GEORGE KRAMBLES
Assistant Operations Planning
Engineer, CTA

Those of us who depend upon rapid transit or suburban train public transportation occasionally run into delays getting to work. You get to the station and sense something wrong from the unusual number of people on the platform. When the train arrives it is "jammed to the numbers," passengers have difficulty getting off and on. It takes two minutes to make a station stop that should only take one-half minute, and each successive stop is slower.

When you finally get to work you may be only 5 or 10 minutes late but your morning is off to a bad start. If, as luck would have it, you have a similar experience at night you're only human if you preface supper by a little speech.

If delays are an annoyance to a passenger, they are a major bugaboo to the rapid transit operating man. He knows that there are, on a typical route, more than 20,000 people to be moved in a single hour over one track. Since 8-car trains have a comfortable capacity of 800 passengers each, he knows that some 25 must be operated on a headway of about 2 minutes between successive trains. Let one of those trains fall 2 minutes late and it will find not 800, but 1600 passengers waiting. Let one become 4 minutes late and there will be 2400 customers competing for space normally allotted to 800. Therefore, delays must be constantly battled.

Sources of Delays

External Causes: The sources of delays are manifold. Some come from causes entirely external to our operation. Best example is weather—everyone ap-

preciates the effects of snow, rain, fog and sleet on all forms of transportation.

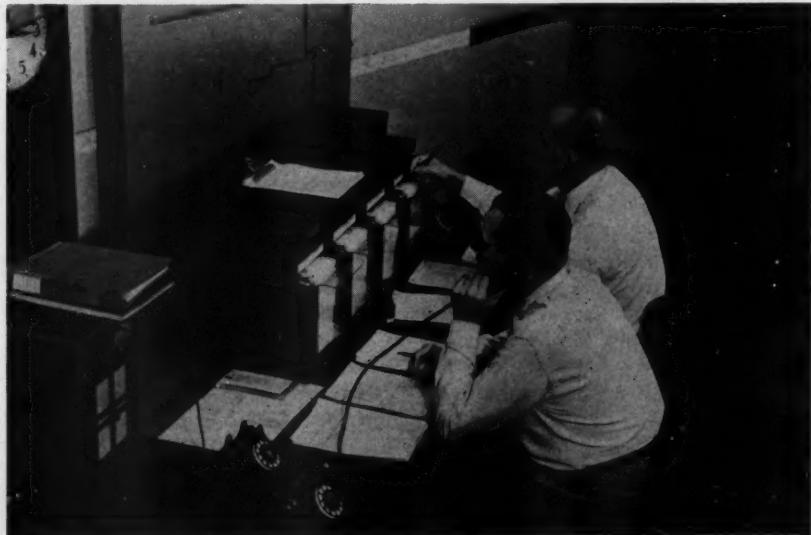
Not so well known is the part played by elevated lines in case of fires, when its structure may be commandeered by the fire department as a scaffold from which to fight fires in adjacent buildings. Naturally, the presence of fire lines and fire fighters across our tracks brings operation to a limp, if not a complete halt.

Public events, such as ball games and meetings, producing heavy loads at unpredictable times are another outside source of delay.

Caused By Other Transportation: A large percentage of rapid transit riders also use connecting railroad, street car and bus services. When delays occur in these services the flow of passengers into rapid transit stations becomes uneven and causes train delays.

Design Problem Causes: Some delays are caused within our rapid transit operation by design restrictions which we hope can one day be removed. For example, most of our routes have connecting branches or share part of their trackage with other lines. The junctions involve level crossings of one route over

CTA line supervisors at work before recording machines which check the progress of rapid transit trains and give immediate warning of delays.



another so that inbound (or outbound) trains of one route in some circumstances cut off the flow of both inbound and outbound trains on the other route.

Another design cause of delays lies in the car equipment. Many trailer cars were inherited in the present operation but not enough to make it practical to predict on just which schedule they will be used.

The Human Causes: With as many as 400 motormen and an equal number of conductors working on a single route, it is to be expected that some crews will be slower than average while others can cut below normal running time by taking advantage of every break of the road.

We are a public carrier and transport the lame, the halt and the blind. More delays than all three of these groups can cause, however, are produced by slow and thoughtless passengers who stand in doorways, those who elbow their way aboard while others are trying to alight and those who never are prepared to pay fare. Some people will delay hundreds of others by holding a door open for a late friend.

Equipment Failure Causes: Finally there is a surprisingly small percentage of delays caused by actual mechanical failures. Examples are: a balky door, a burned out motor, sticky brakes, and signal or power trouble. These are the problems our maintenance engineers are continually striving to overcome by preventive procedures.

Such are the myriad causes of delays. Operation of transportation service apparently involves about as many variables as can be found in any business.

Dealing With Delays

The historic method of dealing with delays on the rapid transit system was thru point supervision. Under the maximum coverage with this plan, supervisors would be stationed at frequent intervals along the line, close enough so that all parts of the line would be under direct view of a supervisor. In actual practice this was reduced somewhat on sections of line with light traffic and no terminal or junction problems. Each supervisor would constantly scan the tracks within his view and immediately proceed to a delayed train to give what assistance he could. There were two major weaknesses in this system: the excessive amount of personnel required, and the restricted effectiveness of the

supervisors due to lack of knowledge of conditions beyond their sight.

With continually increasing labor costs and mounting need for even more effective supervision, CTA decided to develop a new system of train supervision utilizing modern electronic aids to bring comprehensive information to a central supervisor and to enable him to direct a coordinated action by field personnel. It is this broad system which CTA has named "Line Supervision."

CTA Line Supervision System

The collective term "Line Supervision" includes all the equipment required to bring indications of train movements into a central office and present them on recorder machines, plus automatic despatching equipment and communication apparatus.

Heart of the system is accurate time supplied by a high-quality pendulum clock. This clock transmits signal pulses every quarter minute to schedule controller units carrying tapes into which have been carefully punched the schedule of train departures at corresponding terminal stations. When trains are due to depart, the pulses are fed thru the schedule controllers and relay storage units, into line wires on CTA telephone cable to cause green starting lights at the terminal station to light. This is authority for the train to proceed. As it leaves the station it runs thru a track circuit and transmits an indication back over other telephone wires to the central office.

Both the starting signal pulse and the indication of leaving are recorded on adjacent pens of a recording chart at the office. As trains proceed along their trip they are rechecked at intervals of about two miles, and the indications are presented on successive pens so that the full recorder chart presents a complete story of train flow, or breakdown in flow, from end to end of the line.

To relieve the central supervisor from strain of continuous close observation of these charts, certain automatic timers and alarm lights are provided to call his attention to any interruption to the even, regular passing of trains.

Application has been made of an automatic train despather at one point in each direction on the State Street Subway just before entering the central business district. This provides a means for correcting the spacing of trains just before they enter the area of heaviest boarding.

The communication apparatus has two parts. One is a private loudspeaker intercom system that enables the central supervisor to converse with key towermen and supervisors along the lines. The equipment requires a minimum of manipulation so that messages can be expedited. Trimming split-seconds off calling time is extremely important when trains are operated within 40-45 seconds of each other.

In recent months, efficiency of CTA rapid transit operation has been considerably stepped up by faster service and modern multiple unit door control. At the same time even more intensive efforts were required to maintain regularity of service to win additional patronage. These requirements called for improved means of getting special information to crews and passengers.

Therefore, the other new communication facility is platform communication equipment, consisting of a system of many low-level paging speakers distributed on certain busy train platforms. These speakers are operated from a local microphone, or, in the absence of local personnel, they are cut over to remote operation and are used by the central line supervisor thru his intercom system.

Operation of Line Supervision

Handling of A Typical Delay: Should a train drop behind, the line supervisor observes it thru his recording and indicating equipment. Two steps are immediately taken: 1) the nearest supervisor is alerted or sent toward the delayed train, and 2) working with trains ahead of the delay ("leaders"), the "gap" is spread into several train intervals.

For example, if a train becomes three minutes late, the line supervisor will cause two leaders to be held back at some point down-line from the delay. The second train ahead will be held one minute and the first ahead will be held two minutes.

If the normal headway (time-spacing) of trains in this period should have been two minutes, and should no action have been taken, the delayed train would be five minutes behind his leader. With the spacing action described taken, however, the delayed train will be only three minutes from its leader, who would be preceded by two other trains also on three minute headway. Thus, instead of one

(Continued on Page 17)

Science Foundation To Make Grants For Research

The first draft of a guide to assist scientific research investigators in the preparation of proposals for National Science Foundation research grants has been issued by the Foundation. Copies of the guide will be distributed widely to universities and colleges, laboratories, and other organizations in a position to carry on competent scientific research.

The Foundation will support basic research in the mathematical, physical, medical, biological and engineering sciences, by making grants for such research to educational, industrial, governmental or other institutions or individuals. Ordinarily grants will be awarded to institutions for research by specified individuals.

In reviewing proposals the Foundation will emphasize the scientific merit of the suggested research, including the competence of the scientist under whom the study will be made.

During the current fiscal year the Foundation has earmarked approximately \$1,500,000 for support of basic scientific research.

Details may be had by visiting the WSE headquarter's office.

New Turbo-Generator For Public Service Company

A new 110,000 kilowatt turbo-generator has been placed in service at the Waukegan station of the Public Service Company of Northern Illinois, it was announced today by Charles Y. Freeman, chairman of the utility.

The new generating unit, which took about three years to build, has been undergoing tests since December 15. Originally scheduled for service in the spring of 1952, it has gone on the lines several months ahead of schedule.

A major project in the Public Service-Commonwealth Edison system's post-war expansion program, the new Waukegan unit is the sixth new generating unit added to the system since the end of World War II. It brings to 3,062,000 kilowatts the capacity of the system's 11 generating stations serving Chicago and northern Illinois.

"Five additional units are now in various stages of construction," Mr. Freeman said. "These five, with a capacity of 660,000 kilowatts, will bring the total system capacity to 3,722,000 kilowatts by the end of 1954, based on present construction schedules."

"The five units now under way include

two of 150,000 kilowatts each at Edison's Ridgeland station, one of 60,000 kilowatts at Public Service's Dixon station and two of 150,000 kilowatts each to be installed at the new Will County station of Public Service on the Illinois waterway between Lockport and Lemont. Construction of the latter station is expected to get under way later this year."

The new Waukegan unit is the sixth to be installed in that station and the first addition at the plant since 1931. It increases total capacity of the station from 278,000 to 388,000 kilowatts.

The new unit operates at a steam pressure of 1800 pounds per square inch and at a steam temperature of 1000°F. to obtain increased efficiency. The largest unit previously installed at the plant operates at 635 pounds pressure and 775°F. Increases in steam pressures and temperatures have been made possible by important advances in metallurgical research which have resulted in advanced designs for turbo-generators, according to Mr. Freeman.

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SLOGAN CHOSEN FOR CENTENNIAL OF ENGINEERING

In a move to awaken the public to the prominent part the engineering profession has played in bringing America to its present high economic and social levels, the Centennial of Engineering, to be celebrated in Chicago this year, will build all of its activities around the slogan, "Human Well-being Through Engineered Progress."

Adoption of this slogan to tell how engineering as a profession has set the pace for American progress, since the first recognized civilian engineering society came into existence in the United States in 1852, was announced by the Centennial's president, Lenox R. Lohr.

Thinking behind the slogan was voiced by Karl T. Compton, chairman of Massachusetts Institute of Technology. He said: "There is surely a close relationship between the work of engineers and the high standard of living arising from the high per capita production in the United States. Among our professions, that of engineering is outranked in numbers only by teaching and nursing. In no other country is this profession of such high standing. Furthermore, the demand for engineers continually exceeds the supply, and this is because our free enterprise system gives almost limitless opportunity and very great incentive to make things new and to do things better."

The Centennial slogan will be featured by leading industries during 1952 in all sorts of advertising and in special

books and movies being prepared for distribution to the schools and colleges of the country. It will also keynote the new exhibit of world-famed engineering accomplishments to be staged at the Museum of Science and Industry in Chicago during the five-year period starting in mid-1952; and a summer-long pageant also to be conducted at the Museum.

Added impetus was given to the plans for the Centennial of Engineering with the announcement that seven additional national engineering societies have voted to participate actively in the big project.

According to Lenox R. Lohr, addition of these new groups brings the number of societies that will hold national meetings or other special ceremonies during the celebration up to 48. Their inclusion in the program will also mean several thousand additional Centennial visitors to Chicago which already had been planning to play host to at least 35,000 delegates and other guests while the engineering bodies are in session.

The seven latest societies to vote participation follow: American Society of Lubrication Engineers, Illinois Society of Professional Engineers, Institute of Radio Engineers, National Conference on Industrial Hydraulics, National Council of State Boards of Engineering Examiners, National Society of Professional Engineers, and the recently formed Society of Women Engineers.

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WSE To Sponsor Luncheon At Power Conference

The first annual American Power Conference will be held March 26, 27 and 28 at the Sherman Hotel in Chicago, according to R. A. Budenholzer, conference director and professor of mechanical engineering at Illinois Institute of Technology. The meeting will be a continuation of the Midwest Power Conference which has been sponsored by IIT for 13 years. Nine other colleges and universities are cooperating. The name was changed because of the national significance of the previous power meetings.

One of the outstanding events of the three-day conference will be the luncheon to be sponsored by the Western Society of Engineers on March 28. The Western Society, one of the nine cooperating societies for the conference, has been fortunate in obtaining Mr. William J. Grede, president of the National Association of Manufacturers as speaker for their luncheon. Title of Mr. Grede's address will be "Pitfalls and Progress of American Industry." His topic is timely and of vital interest to all engineers. Members of WSE are urged to attend.

More than 50 technical papers will be presented at the 1952 meeting. Included in the 20 sessions will be one on the public's attitude toward socialism and what can be done about it.

Martin H. Kennelly, mayor of Chicago, will address the opening meeting at 9 A.M. Wednesday, March 26. Other luncheon and dinner speakers are: Pressly H. McCance, president, Edison Association of Illuminating Companies; Philip Sporn, president, American Gas and Electric Service Corp., and Leland I. Doan, president, Dow Chemical Co.

(Continued from Page 14)

train catching an impossible overload, a small, but practical extra load is placed on each of three trains.

When delay occurs during peak hours and is too large to be covered by re-spacing of leaders, it becomes necessary to "run" the delayed train. Since it cannot carry all the passengers who would be waiting after such a delay, it becomes a matter of inconveniencing a minimum number of patrons by ordering the delayed train to skip certain scheduled

stops, and thus to permit following lightly loaded trains to assist. This operation is directed thru the intercom system and the platform communication equipment.

During lighter hours many of the platform locations are unattended and if announcements are necessary they are made directly onto the platform by the central line supervisor, timing his announcement from the corresponding train—passing indication and "listening-in" on train operating noises thru the intercom. It has, in fact, been found entirely practical to operate paging systems at some of the busiest platforms by remote control thru the peak of the day.

Results With Line Supervision

Line supervision has proved exceptionally effective in breaking up the damaging effect of small delays. Rebound delays, caused by trains arriving at terminals so late as to be unable to make their scheduled outbound time, have been almost entirely wiped out.

Prompt action in placing in effect coordinated reroute or other emergency operation in the event of major line blockades has greatly cut out-of-service time in such instances.

Cooperation from operating personnel has been one of line supervision's most gratifying aspects. The accurate, automatic despatching, which treats all men alike, is appreciated as is the unseen assistance rendered for even minor delays which used to make trainmen dread rush hour trips. Bunching up of trains at terminals following delays, common before line supervision, has been largely avoided, thus eliminating overloading of track capacity and swamping of yard personnel.

Cooperation of the public has been excellent. The "running" operation, like emergency rerouting over unconventional lines, are better understood. The public appreciates prompt and effective action and objects to a minor inconvenience less when it is clear to them that a coordinated plan is being followed from which all will derive some benefit.

Many problems remain, particularly in developing technique for applying the new tools of line supervision. New uses and refinements are appearing daily. Nothing as complete, or even generally similar, is in use on any other rapid transit system of the world.

Pioneering, even in the 60-year-old act of rapid transit operation, continues.

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Plans For 1952 Ellet Award

The Junior Division of the Western Society of Engineers announces the opening of the Charles Ellet Award competition for 1952.

This award was established in 1929 by a gift from E. C. Schuman a Junior member, and is symbolized by a beautiful loving cup on which is engraved the names of the recipients and the names of their respective schools. The cup is on display at the W.S.E. headquarters. As evidence of the honor bestowed, the winner receives an engraved certificate and a prize of \$25 in cash.

All members under 30 years of age are eligible. The award is made to the member who, in the opinion of the committee of awards, is adjudged to have excelled in the preparation and presentation of a technical paper presented in competition for this award at a meeting of the Junior Division.

Past recipients of this honor have been:

John D. Burlie,
Purdue University.
Francis E. Wolosewick,
Armour '27.
Joseph Kucho,
Irving J. Kadic,
Chicago Tech. '27.
Grover C. Lewis,
Illinois '30.
Robert W. Suman,
Armour '34.
George A. Nelson,
Armour '35.
Raymund V. McGrath,
University of Washington '35.
Ray F. Erickson.
Donald Klusman,
Washington U. '48.

All younger members of the society are urgently recommended to consider entering this competition. It offers an excellent opportunity for the younger engineer to obtain recognition for his endeavors as well as an ideal opportunity for him to acquaint himself with the various aspects of paper preparation

and presentation. Such experience could be invaluable to him in his future professional career.

Formal entrance into the competition may be made by writing the Society headquarters, stating your intention and the subject of your paper.

Further information may be obtained by contacting Society headquarters or Don Klusman, Chairman of the Junior Division, at GReenleaf 5-9921.

Junior Division Meeting

An interesting program was presented at the December meeting of the Junior Division by Mr. George Pope, Assistant Secretary of the Underwriters Laboratories, Inc.—Chicago office.

The keynote of the program was the relationship between the fields of safety and engineering which Mr. Pope illustrated by using examples related to his organization which is staffed by one of the larger engineering groups in Chicago and whose purpose is the development of standards for safety.

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PLAN TO ATTEND

THE Centennial of Engineering

September 3-13, 1952

MAKE WSE YOUR
HEADQUARTERS

WSE Personals

J. N. Stanbery, vice president of the Illinois Bell Telephone Co., recently was elected to the post of chairman of the Chicago Advisory Committee of the Engineering Societies Personnel Service. This committee is made up of representatives from each of the societies sponsoring the personnel service. The position of chairman is rotated each year among the six societies represented on the local committee.

Mr. Stanbery has represented the Western Society for five years.

Vernon L. Davies, a member of WSE since 1919, retired recently from the Public Service Company of Northern

Illinois after 45 years of service.

Starting in Maywood in 1907 with the old North Shore Electric Co. (now a part of the Public Service Co.) Mr. Davis served in numerous supervisory

capacities all in the electrical power field during his career.

He transferred from Maywood to Evanston in 1911 and since then has worked in Joliet, Wheaton and in the company's Chicago office. He was superintendent of system operation for the utility at the time of his retirement.

D. K. Chinlund has been named Division Plant Superintendent of the Illinois Bell Telephone Company. Mr. Chinlund, formerly Commercial Personnel Supervisor, has been an associate member of WSE since 1947.

Edwin A. Hale, a member of WSE, has resigned from the Ralph H. Burke & Co. to accept a position as civil engineer with Pace Associates in Chicago.

William F. Krahl, a life member of the Society, and prominent general contractor, has been named to head the construction division of the Chicago chapter during this year's annual Red Cross Drive.

Dr. Gustav Egloff has gone out west to the heart of the oil country and on February 26 addressed the Engineers Club of the University of Tulsa (Okla.). This club is comprised of petroleum engineer, geology and physics students.

Speaking on "The Modern Oil Indus-

try," Dr. Egloff also addressed the Petroleum Club and other organizations of the Oklahoma Agricultural and Mechanical College, Stillwater, Okla.

On February 27 Dr. Egloff addressed the Tulsa Rotary Club on "Petroleum Research Creates New Industrial Opportunities." He then went to Houston, Texas to attend the dedication ceremonies of the Eastern States Petroleum Company, Inc. in connection with their Platforming and Udex units. On this occasion Dr. Egloff delivered an address entitled "Seventeen Years of Outstanding Achievement."

Graham K. McCorkle, chairman of the board of the Illinois Bell Telephone Co., retired February 1. Mr. McCorkle, who will continue as a director of the company, began his telephone career 50 years ago in Eminence, Ky. After receiving a bachelor of mechanical engineering degree in 1908, he joined the Chicago telephone Company which was the predecessor of Illinois Bell. Mr. McCorkle has seen service in nearly every phase of the telephone business and was elected president of Illinois Bell in 1946, a job he held for three years before being named board chairman.

Obituaries

Daniel E. Moore, a member of WSE since 1948, died in mid-December. After attending the Armour Institute of Technology Mr. Moore joined the staff of the Illinois Bell Telephone Company in 1907 and remained there until his retirement in September 1950. His position was that of Equipment Engineer.

William Gray Potter, one of Western Society's oldest members, died in California on February 2. Mr. Potter joined WSE in 1891, shortly after receiving his degree in Civil Engineering from the University of Wisconsin. In 1938 he was named a Life Member of the Society. Until he retired and moved to Los Angeles in 1936, Mr. Potter was for many years a drainage engineer for the Division of Waterways for the State of Illinois. During the early years of his membership in WSE, Mr. Potter worked on various committees with Isham Randolph and G. A. M. Liljenrantz.

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(Continued from Page 4)

trol, and the distributor drive. This puts the entire skip hoist drive normally on the A. C. power system.

Should the A. C. source fail, the M. G. set drive motor fail, or the D. C. generator fail, it is a very simple matter to throw a changeover switch, putting the skip hoist on the normal mill 250-volt system from where the skip hoist is operated series-parallel. Should the exciter fail separately, the control systems may be thrown to the mill 250-volt supply in like manner.

Most of us would naturally expect that the greatest amount of material going into a blast furnace to be ore. This is not the case. The weight of the air which goes into the production of iron in a blast furnace is $1\frac{1}{2}$ to $1\frac{3}{4}$ times the weight of the materials charged. The power which produces this air is steam rather than electricity. There is a very good reason for that. In most steel mills the boiler and power houses are located relatively close to the blast furnace area because excess blast furnace gas is burned in the boilers. Rather than generate power for transmission to the blast furnace area in large blocks, it is cheaper to drive the blower with a variable speed steam turbine, the air blown being transmitted to the blast furnaces. These modern blowing turbines are 12,000 to 15,000 horse power.

While we have apparently stressed the use of electrical energy in the blast furnace area, it really plays a small part compared to the part it plays in other departments of the mill. The blast furnace area represents only about 5 per cent of the mill power requirement.

Let us now go to the steel producing department, where our iron has arrived via a hot metal car to be stored in one of the mixers until one of the several open hearth furnaces are ready for iron.

The open hearth department of a typical large integrated steel mill may house from 4 to 12 or more furnaces. The open hearth furnaces usually run 150 to as large as 350 tons capacity per heat and require about 9 to 12 hours.

The major connected power load in an open hearth plant is cranes of 350 tons capacity, which are necessary to meet the furnace load capacity. Here again we find the load of such a nature that direct current is indicated as a source of power for over-head cranes, floor charging machines and mixer drives.

The constant speed drives around the open hearth plant again are A. C. These are represented by door drives on the furnaces, fans, damper reversing drives, instrumentation and lighting.

Bessemer Requirements

Associated with the open hearth department and often forming a part of the shop are the Bessemers. The main power requirement here are the blower motors. For a 25-ton Bessemer, the motor required for a blower is approximately 3750 horse power, the blower furnishing 31,750 cu. ft. of air at 25 lbs. These drive motors are wound rotor machines so that the amount of air blown may be varied. The variation is accomplished by varying the secondary resistance by means of a suitable control board.

The tilting motor drive for a Bessemer is direct current with high torque and

accurate control required. Interlocked with the air pressure is a standby source of power which will take over in case of a failure of the shop 250 volt power source. This emergency power may be a storage battery or a Dake air engine, with a storage air tank kept under pressure from the mill air supply with a local compressor as standby. The latter type drive is preferred by most mills.

This seems like a lot of effort and expense to make sure power is available to the tilt drive, but one freeze up would more than offset the cost of such equipment.

Another user of power which comes under the heading of open hearth division or, more accurately, steel producing division, is the electric furnace plant. Here the electrical engineer comes into his own; here we have a power rate of approximately 600 kw hours per ton of steel produced. Why then does the electric furnace plant exist when it requires 600 kw hours to produce a ton of steel, as compared to 8 kw hours per ton in an open hearth? The answer is very simple. The open hearth uses gas or oil to melt its bath while electric power is used directly in an electric furnace.

The class of steels produced in an electric furnace is of a much higher grade than that produced in an open hearth. The products of the electric furnace can and do command a higher price than the average open hearth product. It is important to remember high grade steel may be made in an open hearth and low grade steels may and are made in electric furnaces. Both instances are the exception rather than the rule.

A typical electric furnace plant will take power at 6900 volts, 13.8 K V, 23 K V or even 34.5 K V to the primary of the supply transformers. The secondary voltages 105 to 350 volts to the furnaces are adjustable and may be varied by means of tap changers. Usually six taps are available to the operator by the movement of the tap changer. The transformers usually have 14 or more taps available, six of which may be connected to the tap changer switch at any one time.

The electrode motors (so called), which raise or lower the electrodes, are direct current and should have as little inherent WR² as possible as they are

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required to inch and reverse at a very rapid rate.

Most modern electric furnace installations take advantage of rotating type regulators which tend to aid the speed or response of the electrode motors. The electric furnace door motors and tilting motor are A. C., because there are no special requirements for these drives.

You will note I have used the term "tends" to aid the speed of response. It should be pointed out that any rotating type regulators, and more particularly the electronic type regulators, inherently are much faster than the field they are controlling. This is due to the reluctance of the field, more simply, the magnetic WR². The same thing applies to all such drives, and increases in effect with increased machine size.

One feature of the electric furnace is the primary breaker or contactor. Until recently, oil breakers were the only type of switch available. While they did a fair job electrically, they certainly were not suited to the electric furnace mechanically. They literally fell apart.

When the electric furnace game started, a power type breaker was applied. These breakers, designed to operate perhaps once a month, were suddenly called upon to operate several hundred times daily. Pins wore, sticks broke, bolts fell out and contacts dropped off.

The air breaker has changed that, although it has had to undergo some plastic surgery too. The furnace breaker does not normally open under a load sufficient to create a normal blow out, so it has become necessary to add many features not required of normal breaker service. It is necessary to install surge capacitors and suitable arrestors to cope with the surges associated with furnace switching. Klydonograph records have shown peaks of 12 to 15 times normal voltage, which if not properly drained would soon cause trouble.

Kilowatt Control

In recent years a new device or gadget has been added to the list of electric furnace appendages. It is the power sending or kw control called by the trade name of Optimelt, which insures that the furnace operates at the most effective kw input. Such a control is particularly effective when the electric furnace in question is operating on low

grade steels where the optimum input is required.

Input to a furnace is governed by several factors—capacity of the power transformer, the ability of the bath to absorb heat and the ability of the refractory to withstand the heat. Somewhere near the mid-point of a triangle formed by the above limitations, the furnace will operate most effectively.

Rolling Mill

Probably more to our liking and certainly more appealing is the rolling mill division of our steel plant. It is to this division the output of the steel division ultimately finds its way.

First of all, the ingots which are the end product of the open hearth or the electric plant go to soaking pits where they are held at a uniform temperature until they are uniformly heated throughout their mass.

From the soaking pits the ingot is taken via an electric buggy to the bloom-ing mill entry table. If the end product is to be merchants stock, structural or some similar product, the ingot will go to the blooming mill. If the end product is to be plate, strip or sheet, the ingot will enter the slabbing mill. Separate soaking pits serve the several primary mills.

Large steel mills will have two or more blooming mills, the size of these

units being determined by the mills which follow.

Blooming or slabbing mill drives run up as high as 10,000 horse power. Such units are two motor combinations. The upper and lower rolls are driven directly by 5000 horse power reversing units.

From the blooming mill we come to the billet mill, the structural mill or the merchant bar mill. From the slab mill we now go on to the plate mill or the strip mills.

By the use of individual stand drives in these mills, gearing is eliminated, motor sizes are smaller (the total mill horse power is greater) and the entire mill is much more flexible. A great variety of products can be rolled. Stands may or may not be used.

The entire output of the structural mill, the bar mill or the billet mill ends up on a cooling bed which is quite an extensive arrangement of run out tables and cross feed tables.

Here the mill output is cut to length or otherwise handled. The overhead cranes in these departments play a very important and active part. This is quite different from the use of the cranes in the mill proper, which handle equipment about the mill, snake cobbles, and change rolls.

Contrasted to the blast furnace and steel producing areas, the power distribution for the rolling mills is made

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from the motor rooms for the most part. There are many small distribution substations along a mill floor in addition to the main motor rooms. The main motor rooms are always attended whereas the small control rooms are unattended.

While there is not quite so large a concentration of horse power per stand at the finishing end of the various mills as at the bloomers of slabbers, the individual stands do run up in horse power. They often reach 2,500, 3,500, 4,500 and 5,000 horse power.

The total horse power for the mill, however, is very great. It should be noted that the horse power goes up quite rapidly as the gauge goes down because there is very little metal to flow between the rolls. Temperature of the metal being rolled plays an important part in the horse power requirement, as does the grade of steel.

In no branch of the steel industry has the role of electric drive equipment been so prominent as in the hot and cold strip mills. The rolling process made possible by these mills has revolutionized the industry.

Twenty-five years ago a typical sheet mill requires a large amount of hand labor, which made the process expensive. A sheet bar with dimensions of approximately 8 by $\frac{3}{8}$ by 24 inches was passed several times through and over rolls, handled on each side by skilled hand operators. It was necessary to reheat the sheet several times during this operation. Several such stands were located side by side, with each side of each stand requiring a skilled operator. In spite of the several stands, which were all driven by the same constant speed induction motor equipped with a

large fly wheel, such a mill had a very low tonnage output capacity. The answer was provided by the modern strip mill.

Starting a pass of a modern strip mill is a slab of 4, 5, or even 6 inches thick, the width depending on the end product. This may vary from 30 to 96 inches wide and 6 to 8 feet in length. Passing through the roughing stands numbers 1 to perhaps 4—the slab is not in two stands at any one time. By the time it emerges from stand number 4, it is approximately $\frac{3}{4}$ inch thick and 100 to 150 feet long.

After leaving the roughing stands, the sheet passes through the finishing stands, which are usually six in number. These stands are on approximately 20 foot centers, so that the same sheet obviously will be in all stands at the same time. The rolling speed for each stand increases as the strip is reduced in gauge. To accomplish these speeds and rolling ranges, direct current (2 to 1) speed range motors are used, the horse power running from 2,000 to perhaps 5,000. The power for these stands is supplied by several adjustable voltage generators.

The currents imposed by such loads is no mean problem. It is not uncommon to find currents as high as 70,000 amperes on a common bus. In addition, there is the problem of keeping the temperature in the motor room within livable limits.

The machines usually are down drafted, and the hot discharge air exhausted into heat exchangers located in the basement of the motor room. After the heat is removed from the air, it is re-circulated through the motor

room while the heated water is disposed of. It is not uncommon to encounter losses running as high as 5,000 kw in a typical strip mill motor room. This means the removal of 17,065,000 b.t.u.'s.

The nature of a strip mill load is such that wide fluctuations are encountered. Loads may vary from a few thousands kw to 25,000 or 30,000 kw. If the M.G. sets supplying this load were driven by synchronous motors, power factor correction would suffer badly with increased load provided constant fields were maintained on the sets. To overcome this condition, which also is bad for bus voltage conditions, automatic field excitation control has been adopted generally. In addition to improving voltage regulation, this method of control also will save many thousand kw hours per year because of reduced losses while the mill is idling.

Many new gadgets have been developed in connection with strip mills. One of the most outstanding of these is the X-ray gauge. By means of this device it is possible to measure the thickness of the hot strip leaving the mill at 2,000 ft. per minute and higher speeds.

The flying shear driven by a separate motor has gone high hat. It is controlled by an electronic-Roto-Amphi-Lex system and cuts within $\frac{1}{4}$ of 1 per cent accuracy.

Cold Strip Mill

Let's walk over to the cold strip mill where the output of the hot strip mill is delivered in coil form. The first operation is passing the strip through a so-called pickling (cleaning) line. This removes scale and other blemishes. The strip then is washed to remove acid and is delivered to the tandem cold reduction mill.

A mill for rolling wide sheets may include three stands, which reduce the strip in three passes from a thickness of 0.109 to 0.037 inch. A mill for producing tin plate may include five tandem stands, and will probably reduce a strip about 30 inches wide from a thickness of 0.072 to about 0.010 inch. The strip is wound up in coil from on a tension reel as it is delivered from the last mill stand.

When a limited tonnage or a great diversity of products is needed, cold reduction may be done economically on a reversing cold mill. This consists of a single mill stand with a winding reel

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at either side. By passing the strip back and forth through the mill and taking reduction for each pass, the strip is given the needed thickness. The reels, each driven by separate motors, alternate as winding or unwinding units.

The strip then is passed through a cleaning line to remove oil picked up during the cold rolling. Wound in coil form again, it is annealed in furnaces to remove the hardness created by the cold rolling.

The next operation gives the strip the proper finish and needed physical property. For this purpose the metal is passed through a "temper pass" or "skin pass" mill. The latter consists of one or two stands with paying-out and winding tension reels. Very little reduction in thickness is given to metal in this mill—usually less than 5 per cent.

After this operation the strip is given final processing, such as galvanizing, tin plating and shearing.

Each stand of a cold strip mill and the tension reel are driven by separate D.C. motors. Power is supplied from one or more generators. Generator voltage is used to speed up or slow down the mill as a unit. Motor field control is employed to re-adjust the relative speeds of the several stands and to take care of various rolling schedules.

For each new coil the mill is slowed down to a treading speed. This is done

to bring the strip through the several stands, make a few wraps on the winding reel, and make certain that the metal is under proper tension between the stands and the reel. Then the entire mill is accelerated to its select maximum speed, with the same strip tension substantially maintained. If the latter condition is not met, the expected reductions of strip thickness will not be realized and the strip will be "off gauge." Even with the same setting of rolls, the gauge is apt to be different at high speed than at low speed.

Motor Problems

These operating conditions impose rather severe requirements on the electric equipment. A few of the problems faced by electrical engineers are to accelerate several motors simultaneously while they are held together only by a relatively thin strip, to maintain their relative speeds during this period, and to maintain also a fairly constant tension on the winding reel.

The first task is to design the mill motors suitably. That is, to bring their inertias WR^2 down and, to match, as nearly as possible, the WR^2 of the several motors. This often means splitting the motor capacity at each stand into two, or even four, armatures.

For any given rolling schedule the motors may not be equally loaded. This means the IR drops of their armature

circuits may not be equal. Thus, their relative speeds, if properly matched at low voltage, may not match at maximum speed and voltage. Suitable compensation for IR drop must be provided in the control. An up-to-date arrangement is to provide a separate generator for each of the mill motors and for the reel, thus avoiding a common bus. In spite of this segregation, the voltages of several generators are quickly built up or quickly reduced, and the selected relationship maintained.

To operate these several motors and mill stands in unison, without tearing the thin strip apart and without affecting its gauge requires a carefully laid out control system. The heart of the latter is, again, the high-speed rotating amplifier and regulator, known as the Roto-Amphi-Lex. A number of these rotating regulators are used for building up or maintaining the voltages of the several generators in the selected relationship, for dividing properly the loads between the twin motors, for maintaining constant strip tension on the winding reel,

(Continued on Page 25)

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Reviews of Technical Books

Available at WSE Headquarters

Foundation Engineering

Soil Mechanics, Foundations and Earth Structures, by Gregory P. Tschebotarioff, McGraw Hill Book Company, Incorporated, New York, 1951. \$6.50.

As an outgrowth of a number of years of research on lateral earth pressures, Professor Tschebotarioff has presented in this book an outstanding treatment of the entire subject. He has developed the theory of earth pressures through the work of Rankine and Coulomb to the present state of knowledge on the subject. This section should be of particular interest to structural engineers concerned with foundation design.

The book covers a wealth of subjects from soil physics and geology to the theory of consolidation. All ideas are amplified by excellent illustrations and photographs. An emphasis on the study of known failures of dams, slopes, and structures lends strength to the subjects considered.

The author's reliance on experimental evidence to corroborate theory and historic practice is an important concept.

J.P.G., W.S.E.

Soil Testing

Soil Testing for Engineers, by T. William Lambe, John Wiley and Sons, New York 1951. 165 pages. \$5.00.

This new book on soil testing procedures has the outstanding quality of insisting that the reader or user at all times keeps in mind the limitations of the testing and the purpose for which the testing was intended.

The procedures for all types of tests are discussed, describing the advantages of the various techniques now in use, and recommending an optimum procedure. Actual equipment descriptions and photographs are useful in enabling the unfamiliar reader to evaluate the usefulness of a particular test for his immediate problem. Actual test values which are provided enable the testing engineer to put a "scale" on test results before performing tests.

An excellent set of data sheets are pictured for all tests, in addition to derivations of formulas used in the text for the discriminating reader.

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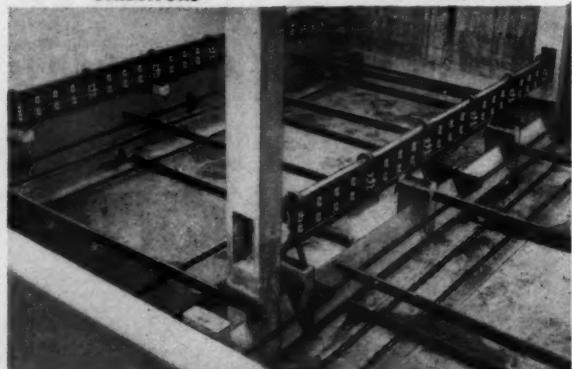


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=WSE Applications=

In accordance with the By-Laws of the Western Society of Engineers, the following names of applicants are being submitted to the Admissions committee for examination as to their qualifications for admission to membership into the Society in the various grades, i.e., Student, Associate, Member, Affiliate, etc. All applicants must meet the highest standards of character and professionalism in order to qualify for admissions.

- 142-83 Richard A. Naatz, Assistant Engineer, Public Service Company of Northern Illinois, 1701 S. 1st Ave., Maywood, Ill.
- 143-83 Clarence T. Fishleigh, Consulting Engineer, 205 W. Wacker Dr.
- 144-83 Carl Hassell, Designer, A. J. Boynton & Co., 109 N. Wabash Av.
- 145-83 Herbert W. Schnabel, Development Engineer, Armour & Company, 1355 W. 31st St.
- 146-83 Norman A. Hennessy, Engineer & Purchasing Agt., Jonathan Woodner Co., 38 S. Dearborn St.
- 147-83 M. W. Oettershagen, Civil Engineer III, City of Chicago, City Hall and Navy Pier.
- 148-83 William G. McEvilly, Sales Representative, Atlas Powder Co., 135 S. LaSalle St.
- 149-83 Joseph G. Manikowski, Draftsman, Leonard Construction Co., 37 S. Wabash Av.
- 150-83 Wilton L. Brown, Assistant Purchasing Agt., The Peoples Gas Light & Coke Co., 122 S. Michigan Av.
- 151-83 Miss Genevieve R. Healy, Designer (Mechanical), Chicago Park District, 425 E. 14th Blvd.
- 152-83 Robert E. Zinn, Consulting Chemical Engr., Vern E. Alden Co., 120 S. LaSalle St.
- 153-83 Benjamin A. Wasil, Instructor, Illinois Institute of Technology, Technology Center.
- 154-83 Max L. Achtenberg, Contract Squad Leader, Freyn Engineering Division of The Koppers Co., 109 N. Wabash Av.
- 155-83 Frederick W. Lincoln, Design

and each member of the Society should be alert to his responsibility to assist the Admissions committee in establishing that these standards are met. Any member of the Society, therefore, who has information relative to the qualifications or fitness of any of the applicants listed below, should inform the Secretary's office, 84 E. Randolph St., Randolph 6-1736.

- Engineer, Koppers Co., 109 N. Wabash Av.
- 156-83 Stanley J. Dalley, Assistant Engineer, Commonwealth Edison Co., 72 W. Adams St.
- 157-83 Walter D. Williams, Construction Inspector, General; Department of Interior, Bureau of Reclamation, Coulee Dam, Wash.
- 158-83 Clifford E. Evanson, President, T.A.B. Engineers, Inc., 767 Milwaukee Av.
- 159-83 Max Reiss, Application Engineer, Westinghouse Electric Corporation, 920 N. Clark St.
- 160-83 Ralph E. Scheffers, Sales Engineer, Joslyn Manufacturing & Supply Co., 20 N. Wacker Dr.
- 161-83 Edward J. Bartos, Industrial Engineer, Danly Machine Specialties, Inc., 2100 S. Laramie Ave., Cicero.
- 162-83 Thomas S. McEwan, Vice President, Utility Survey Co., 4849 N. Western Av.
- 163-83 Thomas G. Morrison, Structural Engineer, A. Benesch & Associates, 30 E. Adams St.
- 164-83 Kenneth M. Rhodes, Junior Structural Designer, A. J. Boynton & Co., 109 N. Wabash Av.
- 165-83 Robert W. Piercy, 816 Vine St., Joliet Ill. — attending Illinois Institute of Technology.
- 166-83 William H. Gehl, Jr., Assisting Vice Pres., Public Service Company of Northern Illinois, 72 W. Adams St.
- 167-83 Philip M. Linscott, Traffic Engineer; DeLeuw, Cather & Co., 150 N. Wacker Dr.
- 168-83 Richard A. Pavia, 1345 S. Clinton Av., Berwyn, Ill., — attending Illinois Institute of Technology.

(Continued from Page 23)

and for several other purposes. It can be said that in a modern cold strip mill the electric equipment acts as the "brains and brawn" of the process. Without the electric equipment, the process would not be feasible. Since the strip is under tension during the rolling, it is important to give the operators some ready means of measuring and indicating this value. Here again electric means are provided with good effect.

A spring-mounted roller is located between the adjacent mill stands or between the last stand and the winding reel. The roller deflects the strip slightly upward (2-3 inches) from the pass line. The higher the strip tension, the stronger the downward push on the roller against the supporting springs. The latter are rather stiff, permitting the maximum vertical travel of about $\frac{1}{8}$ inch. This travel is proportional to the strip tension. By measuring this travel by electromagnetic means such as are used in electric gauges, the strip tension can be readily indicated by electric instruments. In this manner the mill operators are always fully aware of the pull exerted on the strip.

You are probably getting tired of walking by now. So I'd suggest we return to the office, where we can relax and very quickly review the entire electrical system.

We are generating at 13.8 K.V., which if we are a small mill, is the bus voltage. If, however, we are a large mill, we will probably step the generator voltage to 69 K.V. directly with a single transformer per machine. If we purchase power, it too will tie into the 69 K.V. bus. If our system is 13.8, our distribution may be overhead or underground. If, however, the system voltage is 69 K.V., the distribution will more than likely be overhead.

At either voltage, the practice would be to distribute power to the blast furnace area, the steel producing area, the electric furnace area, and the rolling mills. Each of these areas would then transform the incoming voltage to values best adapted to the load conditions.

Switch gear, rather than current valves, often dictate the class of voltage used. It should be remembered, however, that certain fundamental facts, such as choice of voltages or sizes of transformer banks, cannot be thrown overboard to satisfy the electrical engineer's whims.

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Crerar Library

Notes and News

The growth of the Library's collections in engineering and related sciences was active during 1951. More than 730 new books and 297 new periodicals were added during the year. Altogether, the total additions have been 3,749 volumes in the physical sciences and the several branches of engineering—approximately one-third of the total growth of the collections during 1951.

* * *

Two volumes of pamphlets on telegraphy (1855-1873) were recently acquired by the Library. Contained in the second volume is *Modern Telegraphy* (Paris, 1867) by Samuel F. B. Morse, an autographed presentation copy to Charles T. Chester. Mr. Chester was inventor of the automatic street boxes used in New York's first fire alarm system. In the same volume is a thin pamphlet describing "The Fire Alarm Telegraph of New York City."

* * *

The Chicago Heart Association is distributing stamp portraits of twenty-one "Famous Figures in Medical History." Albums, in which the stamps may be mounted, describe the contributions of each person depicted. Only one living physician is included, Chicago's own famous heart specialist, James B. Herrick. The portraits on the stamps were reproduced from Crerar's collection of more than 5,000 portraits of physicians and other important historical figures in the sciences. An exhibit of the heart stamps is located in the ground floor hall of the Library.

* * *

Demand for photostat service from Crerar has increased to a point requiring additional equipment. A dark room for photographic work, and automatic attachments to the present photostat machine are expected to increase the rate of production sufficiently to absorb the new business.

(Continued from Page 7)

3. The ECPD Guidance Committee in every area should notify the local high school principals and counselors that their committee is available and ready to assist in counseling students who wish

information in connection with an engineering education.

4. The ECPD Guidance Committee in every area should learn who the honorary chairmen and the chairmen of the high school science clubs are and inform them that speakers are available to talk to the clubs about the possibilities in the engineering profession.
5. State and local ECPD Guidance Committees should hold forums for discussion in improved methods of procedure.
6. The State and local ECPD guidance committees should suggest to local professional engineering chapters, sections, councils, and other engineering groups that at least one of their meetings this winter should concern itself with the shortage of engineers.
7. Every member of the engineering profession should inform his clients, his associates, his friends and neighbors of the existing critical shortage of engineers with the purpose of directing more young people into the profession and Guidance committees should also attempt to convince a great many engineers now retired that at least for the next few years they should again assume an active part in the work of the profession.
8. Where industry is not using engineers to the full extent of their ability, the local ECPD committees should find ways and means of bringing the matter to the attention of the proper officials directly concerned.
9. Where our armed forces are known not to make the most suitable use of engineers who have been called or drafted into the service the regional chairman of ECPD should obtain and forward complete information to the National Guidance Committee.
10. All engineers and others interested in guidance work should send to their local ECPD guidance committee suggestions that may improve engineering guidance and the names and addresses of those qualified to serve on regional committees or otherwise contribute to the progress of guidance work.

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These items are from information furnished by the Engineering Societies Personnel Service, Inc., Chicago. This SERVICE, operated on a co-operative, non-profit basis, is sponsored by the Western Society of Engineers and the national societies of Civil, Electrical, Mechanical and Mining and Metallurgical Engineers. Apply to ESPS, Chicago and the key number indicated. Prepared ENGINEERS AVAILABLE advertisements limited to 40 words, with typed resume attached may be submitted to ESPS Chicago by members of Western Society of Engineers at no charge.

If placed in a position as a result of an Engineers Available or Position Available advertisement, applicants agree to pay the established placement fee. These rates are available on request and are sufficient to maintain an effective non-profit personnel service. A weekly bulletin of positions open is available to subscribers. Apply ESPS Chicago.

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FIELD ENGINEER, Grad. C.E. or Equiv. Age; up to 40. 5 yrs. exp. required in construction in the field. Duties: supervising engineering crew in field, act as liaison between contractor and owner on construction of power houses and chemical plants near Akron, Ohio. Must be capable of taking complete charge in field. Salary: up to \$125. Company will negotiate fee. Location: Ohio. T-8621.

RECENT GRADUATE: M.E. Age: up to 35. Recent Graduate or better. Knowledge of oil and gas fired furnaces. Duties: developing, designing and testing of domestic heating equipment. Company may help on fee. Salary: \$325 to \$425 per month depending on experience. Location: Ill. T-8622.

GEOLOGIST: Geology. Geological work and preferably in field geological background. 5 yrs. or more exp. desired. Duties: Geology and physiology work on river project. About 4 months assignment. Company may help on fee. Salary up to \$1000 per month and expenses. Location: Greece. R-8623.

PLANT SUPERINTENDENT, to take charge of plant manufacturing screw machine products. Present operations include 32 automatics and 100-150 personnel. Should have well-rounded background in secondary operations such as grinding, milling and drill press work. Salary: \$13,900. Age: open. Location: Midwest. T-8624 D-7530.

RECENT GRADUATE. Age up to 28 Recent Grad. Duties: trouble shooting electro motive devices. Company will help on the fee. Salary \$325/Month. Location: Chicago. R-8625.

DRAFTSMAN Mechanical. 2 yrs. exp. required as draftsman on mechanical equipment. Duties: drafting and train for junior design work on printing and bindery equipment. Salary. \$90/week. Location: Chicago. R-8626.

MAINTENANCE AND INSTALLATION ENGINEER. Age: 40-55. 5 yrs. plus exp. in installation and maintenance

of heavy equipment, distillation units, generating plants and high pressure boilers. Duties: supervising maintenance and installation on above equipment. Must be able to be cleared by F.B.I. Job good for about eight months. Salary \$400-\$500 per week. Location: Cold climate overseas. R-8627.

ASSISTANT CHIEF ENGINEER under 38 with electrical degree and five to ten yrs. practical experience in power distribution field, for supervision and administration of engineering department and laboratory; sales engineering, customer help, product applications, product development. Location: South. T-8628 Y-6657 CD.

INDUSTRIAL ENGINEER I.E. 30-45. 5 yrs. exp. in varied industrial engineering systems, or accounting and must know tabulating equipment. Knowledge of cost accounting and general accounting. Duties: systems and methods work involving industrial engineering and accounting. Co. may pay the fee. Salary \$7200-\$8000 Per Yr. Location: Missouri. T-8632.

CHIEF METALLURGIST. College. Age: 22-40. If no practical metallurgical experience, require college degree in Metallurgy or Chemistry. Knowledge of Metallurgy and/or Chemistry. Duties: supervision and control of finished castings. Plant Mechanical Engr. Development of improved procedures in foundry. Investigation other alloys that will fit into present type business. For a foundry of nickel, chrome and cobalt alloys — corrosion resistant. Salary: \$4800-\$6000. Company will negotiate the fee. Location: Illinois. Very little traveling. R-8633.

DIE DESIGNER. 1 yr. plus exp. after apprenticeship or 5 yrs. otherwise on the board. Knowledge of sheet metal dies. Duties: die designing and some process work and maintenance of engineering records. Company may negotiate the fee. Salary \$110-\$115 per week. Location: Chicago. R-8634.

ENGINEERS AVAILABLE

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CHEM. ENGR. Chem. Eng. 25. Two yrs. Lab. Chem. Engr. Production control testing, production supervision, lab. development, new products, complaints, physical and electrical testing of plastics. Three mos. Serviceman. Repair of gas appliances. Three mos. Assistant Chemist. Routine analysis on special projects. Midwest. \$4500. 284-M.W.

SALES ENGINEER. EE. 30. Eight mos. Sales Engr. Contacting customers, working out problems of design and application for condensers. Three and one half yrs. Building Manager. Managing buildings, letting out 7 supervising of contracts. One yr. Trainee in all phases of radio production. Seven yrs. Installation and repair service on telephone and signal equipment. \$4200. Midwest. 285-M.W.

RESEARCH, CE. 39. Five yrs. Ass't Str. Engr. Conducting tests on railroad structures with electronic instruments recording the stresses, and compiling data in office. Two yrs. Designer and Detailer. Designing heavy industrial steel and detailing structural steel mill buildings. Four and one half yrs. Field Engr. In field on erection of mill buildings and bridges. One half yr. working in warehouse checking and bending reinforcing bars. \$6500. Midwest. 286-M.W.

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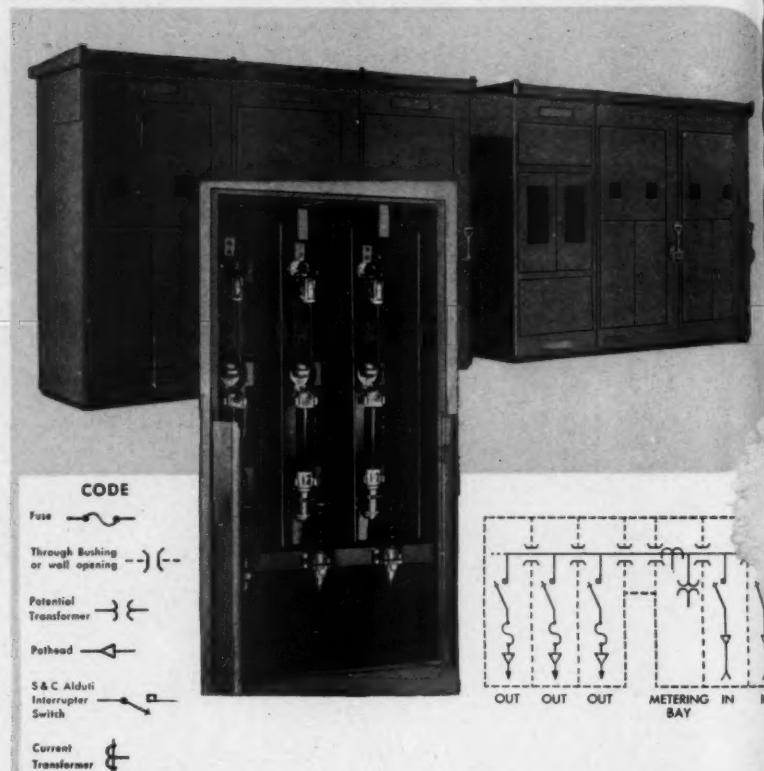
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Midwest Engineer

A Publication of the

WESTERN SOCIETY OF ENGINEERS

Serving the Engineering Profession



JANUARY, 1952

PART TWO

Vol. 4, No. 5

Message from the President

A review of the activity of the Western Society of Engineers during the year brings forth the fact that a greater number of our members are taking an active interest in the Society. The membership committee has been very active and merits the support of each and every member. The influx of new members is the life-blood of the Society.

The Board of Direction of your Society, while aware of its responsibility to maintain the traditions, purposes, and objectives of WSE, knows that the real work of the Society is performed by the continuous cooperation of the members who take an active interest in one or another, if not all, of the organization's activities.

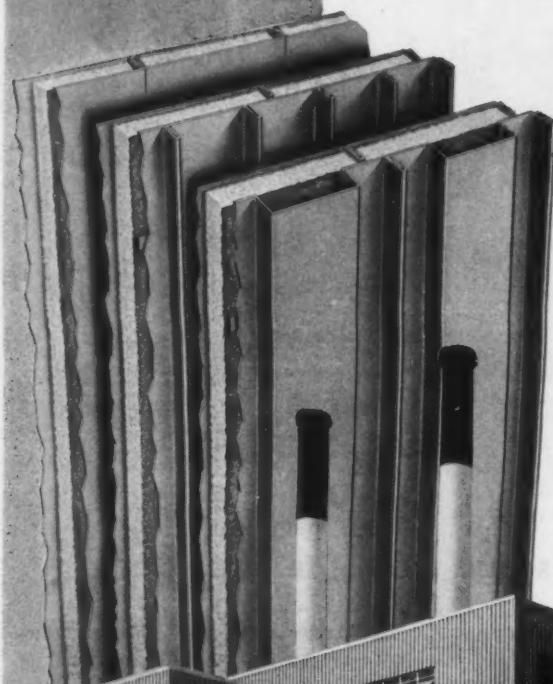
It is recognized that the real work of the Society is achieved mainly by the unselfish cooperation of the members who faithfully serve on the various Committees, Sections, Divisions, and the Women's Professional Council. To these the credit should go for keeping WSE an active and progressive force in this region.

The Western Society of Engineers offers much for the engineers of the area. The facilities it provides, both physically and professionally, should attract non-member engineers and people whose business interests involve engineering, to seek WSE membership because of the opportunity afforded to round out their careers. Through the vision and initiative of its members, collectively and individually, WSE will continue to recognize its responsibility to serve the profession and the community in which we work and dwell.

Donald N. Becker

INSULATED METAL WALLS

for INDUSTRIAL and COMMERCIAL BUILDINGS
ALUMINUM, STAINLESS or GALVANIZED STEEL

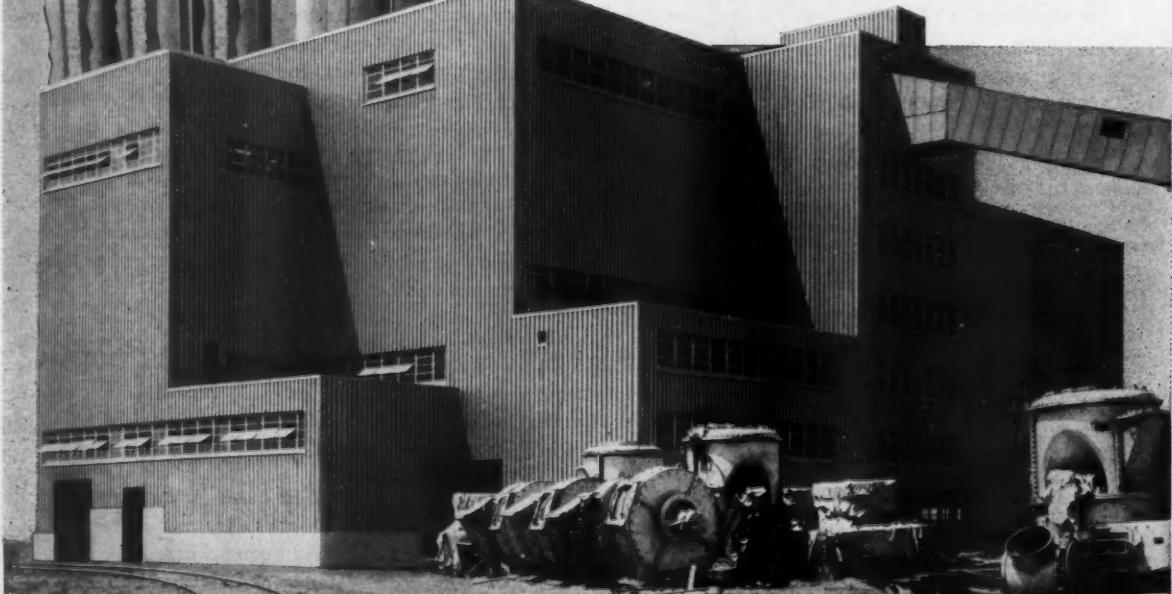


The Power Plant illustrated below is further evidence of a design trend and the prominent place Insulated Metal Walls occupy in present day construction . . . it is typical of fourteen structures, including two complete industrial plants, presently under construction—and dozens of others in the planning stage. The exterior wall surfaces of this building are Stainless Steel throughout . . . permanent, firesafe material requiring no maintenance whatsoever. Mahon Insulated Metal Walls are available in three distinct exterior patterns as shown at left. Walls may be erected up to 50 feet in height without horizontal joints. Thermal properties are excellent—insulation provides an overall "U" Factor equivalent to that of a conventional 16" masonry wall. Mahon Insulated Metal Walls, together with a Mahon Steel Deck Roof, provide the ultimate in economy, permanence, and firesafety in modern construction. See Sweet's Files for complete information, or write for Catalog No. B-52-B.

THE R. C. MAHON COMPANY

Detroit 34, Mich. • Chicago 4, Ill. • Representatives in Principal Cities

Manufacturers of Insulated Metal Walls; Steel Deck for Roofs, Floor and Partitions; Rolling Steel Doors, Grilles, and Underwriters' Labeled Rolling Steel Doors and Fire Shutters.



MAHON

The Western Society Of Engineers

CONSTITUTION

Adopted May 31, 1922 with Subsequent Amendments
Including Amendment Adopted June 4, 1951

ARTICLE I

Name and Location

Sec. 1. The name of this association shall be The Western Society of Engineers.

Sec. 2. The offices of the Society shall be located in the City of Chicago, Illinois.

ARTICLE II

Objects

Sec. 1. The objects of this Society shall be the advancement of the theory and practice of engineering, the improvement of the status of engineering practice as a profession, and the maintenance of high professional standards.

ARTICLE III

Seal

Sec. 1. The seal of the Society shall be as reproduced herewith.



Sec. 2. All official instruments issued by or under the authority of the Society shall be authenticated by this seal. The Secretary of the Society shall be the custodian of the seal.

ARTICLE IV

Policy

Sec. 1. The Society shall neither endorse nor recommend any individual or any scientific or engineering production, except in the interest of the public or the profession. The opinion of the Society may be expressed on such subjects as pertain to the public welfare.

ARTICLE V

Membership

Sec. 1. The membership shall be open to persons of good character skilled or interested in engineering.

Sec. 2. The membership shall be divided into grades to be known as Honorary Members, Members, Associate Members, Student Members and Affiliate Members.

Sec. 3. The Honorary Members, Members and Associate Members shall constitute the corporate membership of the Society and have the exclusive right to vote and hold office.

Sec. 4. An Honorary Member shall be a person of acknowledged eminence in engineering, or in a science related thereto, or who has rendered outstanding service to the engineering profession. There shall be no more than fifteen such members

at any one time; no more than two may be elected in any one fiscal year.

Sec. 5. A Member, at the time of his admission or advancement to that grade, shall:

Be a graduate of an engineering curriculum approved by the Board of Direction of the Society and shall in addition have had not less than four years of increasingly important engineering experience, indicative of growth in engineering competency and achievement and of a character satisfactory to that Board, at least two years of which shall be in responsible charge of engineering work.

Or, if not a graduate, he shall have had equivalent attainments including not less than ten years of increasingly important engineering experience, indicative of growth in engineering competency and achievement and of a character satisfactory to the Board of Direction of the Society, at least two years of which shall be in responsible charge of engineering work.

Sec. 6. An Associate Member shall, at the time of his admission or advancement to that grade, be:

A graduate of an engineering curriculum approved by the Board of Direction of the Society.

Or, if not a graduate, he shall have equivalent attainments, including at least six years of engineering experience of a character satisfactory to the Board of Direction.

He shall transfer to Member grade not later than his 35th birthday.

Sec. 7. A Student Member shall be registered in an undergraduate or a graduate engineering curriculum approved by the Board of Direction of the Society and shall be pursuing a course of study in preparation for the engineering profession.

He will become an Associate Member automatically upon graduation from said approved course, which graduation is properly attested by a statement from the school or college.

Sec. 8. An affiliate Member shall be a person not qualified for Member or Associate Member grades, but who is interested in the advancement of engineering, as may be evidenced by an employment which has involved dealing or associating with engineers for a period of at least two years.

Sec. 9. All members whose residence or principal place of business is within fifty miles of the Chicago post office shall be deemed resident; those beyond that limit shall be deemed non-resident.

ARTICLE VI

Admissions and Resignations

Sec. 1. All elections to membership shall be made by the Board of Direction. The affirmative vote of a majority of the entire membership of the Board shall be required for election to all grades except Honorary Member. Each candidate elected shall be duly notified of his election, and shall indicate his acceptance of membership by

subscription to the Constitution and the payment of entrance fee and dues. If acceptance is not received within sixty days from the date of election, it shall be void unless the time shall be extended by the Board.

Sec. 2. Proposal for Honorary membership shall be submitted in writing by at least fifteen Corporate Members, who shall state their reason for the proposal. Election shall be by ballot, and shall require the affirmative vote of three-fourths of the entire membership of the Board. A person so elected shall be notified promptly by letter. The election shall be void if acceptance is not received within three months after mailing such notice.

Sec. 3. A member may resign by advising the Secretary in writing to that effect. The Secretary shall present such communication to the Board of Direction at its next regular meeting and it shall accept the resignation when all dues are paid.

ARTICLE VII

Fees and Dues

As Amended June 4, 1951

Sec. 1. The fees and dues for the various grades of membership shall be as follows:

	Annual Dues	Entrance Fee	Resident	Non-Resident
Honorary	None	None	None
Member	\$20.00	\$20.00	\$13.50
Assoc. Member (Age 30-35 years)	15.00	15.00	10.00
Assoc. Member (To age 30 years)	10.00	10.00	6.50
Assoc. Member (Transfer from student member)	None	10.00	6.50
Affiliate Member	16.50	16.50	11.50
Student Member	None	3.50	3.50

From each of these annual dues \$2.50 shall be set aside as subscription to the publication of The Western Society of Engineers.

On transfer to a higher grade, the entrance fee previously credited to a member shall be applied against the entrance fee for the new grade.

Sec. 2. A person elected to any grade of membership shall pay dues for the fiscal year in which elected, proportional to the part of the year remaining at the time of election.

Sec. 3. If the dues of any member are not paid before December first, he shall lose the right to vote and to receive the publications of the Society.

The Board of Direction may, by an affirmative vote of a majority of its members, grant extension, or excuse members from payment of dues, or waive the entrance fee if in the best interests of the Society.

Sec. 4. A member shall be liable for the payment of dues until he shall have resigned, been expelled, or relieved from the payment of said

dues in accordance with the provisions of this Constitution.

Sec. 5. Corporate and Affiliate Members over sixty years of age shall not be billed for dues after having paid thirty years' dues. Such members shall be known as Life Members, but this designation shall not be construed to establish a separate grade of membership.

Sec. 6. The fiscal year shall commence with the first day of June.

ARTICLE VIII Officers

Sec. 1. The officers of the Society shall be a President, a First Vice President, a Second Vice President, a Secretary, a Treasurer and six Trustees.

Sec. 2. A vacancy in any of these offices shall be filled for the unexpired term by the Board of Direction. The appointee so selected shall not be ineligible for election to succeed himself.

ARTICLE IX Management

Sec. 1. The management of the Society shall be vested in a Board of Direction, consisting of the President, the two Vice Presidents, the Treasurer, the six Trustees and the two most recent Past Presidents who continue to be members.

Sec. 2. The Board of Direction shall hold regular meetings at least once every month. A majority of the entire membership of the Board shall constitute a quorum. Special meetings shall be called upon the order of the President, or at the written request of three members of the Board.

Sec. 3. The Board shall supervise the investment and care of the funds of the Society; prescribe the system of accounts; make appropriations for specific purposes; act upon applications for membership as provided in Article VI, Section 1; adopt and revise such By-Laws as may be necessary for the proper conduct of the affairs of the Society and are not inconsistent with this Constitution; appoint such committees as are provided for in the By-Laws; and perform such other acts as are not inconsistent with this Constitution.

ARTICLE X Nomination and Election of Officers

Sec. 1. The President, the Vice Presidents and the Treasurer shall be elected annually and shall hold office for one year and until their successors are elected and qualified. The Trustees shall hold office for three years, two being elected each year.

Sec. 2. The Secretary shall be elected by the Board of Direction at its first regular meeting in each fiscal year or at an adjourned session thereof. An affirmative vote of a majority of the entire Board shall be required for election. He shall hold office for one year or until his successor is elected and qualified.

Sec. 3. Each December the Board of Direction shall elect a Nominating Committee of seven Corporate Members, of whom one, and only one, shall be a member of the Board, and not more than three of whom shall have served on the Nominating Committee within the previous three years. The appointment of this Committee shall be announced and suggestions for nominees solicited in the next regular issues of the publication of the Society.

Sec. 4. The Nominating Committee shall meet not later than January fifteenth and organize by electing from its membership a Chairman and a Secretary. It shall nominate a President, a First Vice President, a second Vice President, a Treas-

urer and two Trustees. Before reporting to the Board, the Committee shall secure the acceptance of each nominee.

The Committee shall present its report to the Board of Direction at its regular February meeting. If the Board of Direction shall find any nominee ineligible for the office for which he is nominated, or if any vacancy should occur from any cause, the Board shall select another nominee therefore. The nominations so reported shall be known as the Regular Ticket.

Promptly after the February meeting of the Board of Direction, a copy of the Regular Ticket shall be mailed to every Corporate Member.

Sec. 5. Additional nominations for any office provided for in Sec. 4 of this Article may be made by petition signed by at least twenty Corporate Members. Such petition shall be accompanied by the acceptance of the nomination by each nominee in writing and shall be filed with the Secretary of the Society before the twentieth day of March. Any petition so filed shall be presented to the Board of Direction at its regular March meeting. If the Board shall find any person so nominated ineligible for the office for which he is nominated, the petition as it relates to such nominee shall be rejected. Nominations made in accordance with this section shall be known as a Ticket by Petition.

Sec. 6. Corporate Members who are in arrears in the payment of their dues shall not be eligible for office.

Sec. 7. The President shall not be eligible for re-election.

Sec. 8. On or before the first day of April a letter-ballot shall be sent to each Corporate Member on which shall appear the names of all the candidates to be voted upon, so arranged as to indicate nominees of the Regular Ticket and of the Ticket, or Tickets, by Petition.

Sec. 9. The polls shall close at 12 o'clock noon, the fourth Monday in April. The Secretary shall certify to the competency of the voters and deliver their ballots to three Judges of Election appointed by the Board. These Judges shall canvass the ballots publicly and report the results of the canvass to the Board, which shall, by resolution, declare elected to their respective offices those candidates who have received a plurality of the votes cast. In case of a tie vote between two or more candidates for the same office, the Board shall decide by ballot between the candidates thus tied.

Sec. 10. The officers-elect shall assume their duties on the first day of June.

ARTICLE XI Duties of Officers

Sec. 1. The President shall have general supervision of the affairs of the Society. He shall preside at meetings of the Society, and of the Board of Direction; shall appoint all committees not otherwise provided for, subject to the approval of the Board; and shall be an ex-officio member of all committees. He shall, jointly with the Secretary, sign all contracts and other written obligations of the Society which have been approved by the Board. At the Annual Meetings, he shall report on the general condition of the Society. The Vice Presidents in order of seniority shall preside at meetings and perform the duties of the President in his absence or in case the office becomes vacant.

Sec. 2. The Treasurer shall receive and deposit all moneys of the Society as designated by the Board of Direction. He shall pay all bills when approved in accordance with rules prescribed by the Board. He shall keep regular accounts of all receipts and expenditures in such form as the Board prescribes, which record shall be open at all times to inspection by the Board.

He shall give a bond in such amount and with such sureties as the Board may require. He shall make an Annual Report, and such other reports as the Board may require.

Sec. 3. The Secretary shall be the Executive Officer of the Society, subject to the direction of the President and the Board. He shall have charge of the property of the Society, and shall conduct its business, under rules prescribed by the President, sign all contracts and other written obligations approved by the Board. He shall make and preserve a record of all proceedings of the Board. He shall make an Annual Report, and such other reports as the Board may require. He shall give a bond in such amount and with such sureties as the Board may require. The amount of his salary shall be determined annually by the Board at its first regular meeting.

ARTICLE XII Subdivisions

Sec. 1. The Board of Direction may authorize the formation of subdivisions of the Society for the more convenient study and discussion of special fields or functions of engineering, as set forth in the By-Laws.

ARTICLE XIII Meetings

Sec. 1. The Annual Meeting of the Society shall be held on the first Monday in June, at which time the Annual Reports shall be received and other business transacted.

Sec. 2. Other meetings may be called by the President; and shall be called on the request of ten Corporate Members, which request shall state the purpose of the meeting. Not less than one week prior to the date of each such meeting, the Secretary shall mail to each member a notice which shall state the purpose of the meeting; and no other business shall be considered therat.

Sec. 3. At all meetings of the Society twenty-five Corporate Members shall constitute a quorum.

Sec. 4. Technical and social meetings of the Society and of its subdivisions shall be held at such times and places as may be provided in the By-Laws or approved by the Board.

ARTICLE XIV Discipline

Sec. 1. The Society, through its Board of Direction, shall have the power to investigate and pass upon the conduct of its members alleged to be in violation of the Code of Ethics of the Society or otherwise inimical to the interests of the engineering profession or the Society.

Sec. 2. Upon alleged misconduct of a member coming to the notice of the Board, or upon filing of charges against a member signed by ten or more Corporate Members, the Board shall examine the charges, and if there appears to be sufficient reason for a hearing thereon, shall fix a date for such hearing, and shall, not less than thirty days before said date, notify the accused thereof by registered letter sent to his last known post office address, accompanied by a copy of the charges and a copy of this Article. At the hearing, the accused may hear all charges and all evidence adduced in support thereof, hear and at his option cross-examine any witnesses called in support of the charges, produce and examine witnesses in his defense, offer documentary evidence, and make an oral and a written statement in his own behalf. Promptly after the conclusion of the hearing, the Board shall consider the evidence and render its decision. A two-thirds vote of the entire Board shall be necessary to sustain the charges. If they are thus sustained, the Board shall fix the penalty at suspension for a stated period or expulsion, and shall

notify the member that the decision becomes effective at the end of one month unless the accused previously enters a written appeal therefrom.

Sec. 3. Appeals shall be submitted to the Corporate Members by letter-ballot in a form to be prescribed by the Board. The ballot shall be accompanied by a statement of the charges, the Board's action thereon, together with such information as is deemed proper, and the defense of the member making the appeal. Twenty days after being sent to the Corporate Members, the ballots shall be canvassed by the Board. A majority of the votes cast shall be required to sustain the action of the Board. The Board shall notify the appellant and the Corporate Members of the result of the canvass of the ballots.

Sec. 4. No disciplinary proceedings of the

Society shall be given publicity except as provided in this Article.

ARTICLE XV Amendments

Sec. 1. Proposed amendments to the Constitution shall be submitted to the Secretary in writing and signed by not less than twenty-five Corporate Members.

The proposed amendments shall be submitted to the Board of Direction at its next regular meeting and referred by it to the Amendments Committee, which shall report on them to the Board not later than the following regular meeting of the Board.

Sec. 2. Proposed amendments, unless withdrawn, shall be printed and mailed to all Cor-

porate Members at least fifteen days prior to the meeting of the Society at which they shall be the order of business for discussion; they may be modified in any manner pertinent to the original amendments by a majority vote of the Corporate Members present at such meeting.

Sec. 3. The proposed amendments shall then be voted upon by letter-ballot, which ballot shall be due not later than thirty days after the meeting provided for in Sec. 2 of this Article and shall be counted promptly thereafter. In balloting on proposed amendments to the Constitution, an affirmative vote of two-thirds of all the ballots cast shall be necessary for adoption. Amendments so adopted shall take effect at the next Annual Meeting, unless the amendments are accompanied by a resolution of the Board providing that they shall take effect at an earlier date.

BY-LAWS

Adopted May 31, 1922

Including Amendment Adopted January 27, 1949

ARTICLE I Admission to Membership

Sec. 1. Applications for admission, transfer or reinstatement shall be in such form as the Board of Direction may prescribe. They shall embody a concise statement of the candidate's education and professional experience, with dates and descriptions of work in which he has been engaged.

Sec. 2. Sub-professional Work is to cover the time spent as rodman, chainman, recorder, or draftsman; and also the time spent as instrument man or inspector when working under direct supervision or on work where the personal responsibility and technical knowledge required are small; that is, minor positions in which the responsibility is slight of a task, set and supervised by a superior, is all that is required. It shall also include time during which he has been occupied in engineering work before he is 21 years old, except as modified by the statement in regard to education of Professional Work. No account is to be taken of work done before the applicant is 16 years old, or of work performed during vacations. In figuring the years of "active practice in engineering work" each year of Sub-professional Work shall be rated as equivalent to one-half year of Professional Work.

Responsible Charge of Work Means

a. In the field, the applicant must have had the direction of work, the successful accomplishment of which rested upon him, where he had to decide questions of methods of execution and suitability of materials, without relying upon advice or instructions from his superior, and of supplying deficiencies in plans or correcting errors in design without first referring them to higher authority for approval, except in cases where such approval is a mere matter of form.

b. In the office, the applicant must have had to undertake investigations, or carry out important assignments, demanding resourcefulness and originality, or to make plans, write specifications and direct the drafting and computations for designs of engineering work, with only rough sketches, general information and field measurements for reference and guidance.

c. In engineering teaching, the applicant must have taught in an engineering school of recognized reputation, and must have had, at least,

a grade of assistant professor, or its equivalent.

Design means all that is given above as responsible charge of work in the office, and more. One qualified to design must be able, in the case of any desired piece of engineering, to meet the exigencies of the case, to fulfill the requirements of local circumstances and conditions, and yet not violate any of the canons of engineering. His plan, when executed, must successfully answer the purpose for which it was designed.

Professional Work shall include only the time after the applicant is 21 years old, during which he has been occupied in engineering work of a higher grade and responsibility than that above defined as Sub-professional Work. Time spent in engineering teaching subsequent to graduation shall be listed as professional work.

Sec. 3. An applicant for admission, transfer or reinstatement shall refer to at least three members to whom he is personally known. An applicant for Student grade need refer only to the dean or other authority of the school in which he is enrolled.

Sec. 4. If sufficient information is not received from the requisite number of references, the Secretary shall call on the applicant for additional references. Applicants who may not be personally known to the requisite number of members may be recommended for membership by three members of the Board of Direction after evidence has been secured sufficient, in their opinion, to warrant admission.

Sec. 5. The names of all applicants shall be published with a request for information regarding their qualifications for membership in the Society.

Sec. 6. Any applicant for admission or reinstatement, whose application may have been rejected by the Board of Direction, may make a new application at any time after one year from the date of the rejection of his previous application. Such new application shall be considered in conjunction with the previous application.

ARTICLE II Fees and Dues

Sec. 1. Dues shall be payable annually in advance and shall become due on the first day of June of each year.

Sec. 2. Any person whose dues are more than three months in arrears shall be notified of this fact promptly by the Secretary.

Sec. 3. On December 1 of each year the Secretary shall notify all members, whose dues remain unpaid, of the provisions of Article VII, Section 3, of the Constitution. The Secretary shall report on the status of unpaid dues at the April meeting of the Board.

Sec. 4. Any member whose dues remain unpaid shall be reported to the Board at the May meeting, and, unless payment is received or extension is granted, his membership shall terminate at the close of the fiscal year.

ARTICLE III Duties of Officers and Committees As Amended Jan. 27, 1949

Sec. 1. At the first meeting of each new Board, one of the Trustees shall be designated as Assistant Secretary, who shall serve without compensation.

Sec. 2. The Secretary, or in his absence the Assistant Secretary, shall attend all meetings of the Board of Direction. The Secretary or his authorized representative shall attend all meetings of the Society and its Sections.

Sec. 3. The Secretary shall be responsible for the employment and supervision of such staff as may be necessary to carry on the work of the Society, including one or more Assistant Secretaries, providing that the employment of such staff is authorized by the Board of Direction.

Sec. 4. All vouchers or checks drawn against the funds of the Society shall be payable only when signed by the Treasurer, President or one of the Vice-Presidents and countersigned by the Secretary or Assistant Secretary.

Sec. 5. The Board of Direction may create an Executive Committee, consisting of the President, the Immediate Past President, the Vice Presidents and the Treasurer, which committee shall exercise such authority of the Board as may be delegated to it when the Board is not in session. It shall report at each regular meeting of the Board of Direction. The Executive Committee shall not have power to amend the By-Laws, elect or expel

members, or fill vacancies on the Board of Direction.

Sec. 6. The Board of Direction shall appoint: A Finance Committee, a Program Committee, a Publications Committee, a Library Committee, an Admissions Committee, an Amendments Committee and a House Committee.

Each of these committees, except the Amendments Committee, shall be composed of not less than three Corporate Members of the Society, at least one of whom shall be a member of the Board. The Amendments Committee shall be composed of five Corporate Members of the Society, three of whom shall be the three latest Past Presidents who continue to be members of the Society. At least one member of the Finance and of the Library Committees and two members of the Program and of the Publications Committees shall have served on the same committees during the previous year. The chairman of the Program Committee shall be an ex-officio member of the Publications Committee and the chairman of the Publications Committee shall be an ex-officio member of the Program Committee.

Sec. 7. The Finance Committee shall have immediate supervision over the financial affairs of the Society and shall report thereon monthly to the Board. It shall certify all bills for payment. It shall appoint a registered public accountant to supervise the accounting and to audit the books of the Society, as of May 31 of each year which audit shall be included in its report.

The Finance Committee shall submit to the Board of Direction at the regular July meeting in each year a budget of expenses for the current fiscal year. Only routine office expenses shall be incurred in advance of the approval of the budget, except by specific authorization of the Board of Direction.

Sec. 8. The Program Committee shall be responsible for all programs for all meetings of the Society at large, the Sections and the Divisions. It shall commence planning these programs promptly after appointment and not later than the beginning of the third month of the administrative year. The Program Committee shall organize and arrange all programs for meetings of the Society at large. It shall receive the assistance of the Executive Committees of the Sections and the Councils of the Divisions for the purpose of supervising and coordinating all programs for meetings of the Sections and Divisions.

Not later than one month after the close of the administrative year, the committee shall submit its annual report which shall include a complete tabulation of all meetings of the Society, and its Sections and Divisions, together with any recommendations and suggestions which it believes will be of benefit to the Society.

The Committee shall prepare rules, which, when approved by the Board of Direction, shall govern the preparation and presentation of papers.

Sec. 9. The Publications Committee shall supervise the publications of the Society. It shall prepare rules, which when approved by the Board of Direction, shall govern the publications of the Society.

Sec. 10. No paper for presentation or material for publication shall be accepted, which contains information readily found elsewhere, or especially advocates personal interests, or is carelessly prepared, or is foreign to the purposes of the Society.

Sec. 11. The Library Committee shall have general supervision over the library, the relations between The Western Society of Engineers and the John Crerar Library as established under the

contract between the two organizations, and the library services established between the Society and the John Crerar Library.

Sec. 12. The Admissions Committee shall investigate all applications for membership and report thereon to the Board of Direction.

Sec. 13. The Amendments Committee shall consider and make a report to the Board on all proposed amendments to the Constitution referred to it in accordance with Article XV, Sec. 1, of the Constitution. It shall also give consideration to formulation and/or revisions of the By-Laws and/or Rules which it considers desirable, or which are referred to it, and shall report to the Board thereon.

Sec. 14. The House Committee shall have general supervision of the rooms in the Society's headquarters and property therein.

ARTICLE IV Subdivisions

(Sections, Divisions and Branches)

Sec. 1. A section shall consist of members of the Society interested in the more intimate study and discussion of a particular field of engineering. A section may be formed upon the written application to the Board of five per cent or more of the membership of the Society if in the opinion of the Board, it is in the interest of the Society as a whole.

Sec. 2. A division shall consist of members of the Society whose professional interests are of the same general character but not restricted to any particular field of engineering. A division may be formed upon the written request of forty or more members of the Society if in the opinion of the Board, it is in the interest of the Society as a whole.

Sec. 3. The Board of Direction may at its discretion abolish a section or division if more than three months elapse from the date of authorization of such section or division before it is in active operation, or if at any time its membership falls below the number required for authorization, or for other satisfactory reasons; but this action shall be taken only after a resolution to abolish such section or division shall have been introduced at a regular meeting of the Board and laid over until a subsequent meeting, at which latter meeting the affirmative vote of two-thirds of the entire membership of the Board, obtained by letter-ballot if necessary, shall be required.

Sec. 4. A branch shall consist of members of the faculty, other instructing staff, and students enrolled in an engineering course in a college of recognized standing.

Sec. 5. The organization, management and operation of sections, divisions and branches shall be in accordance with rules approved by the Board of Direction.

ARTICLE V Meetings

As Amended Jan. 29, 1948

Sec. 1. Meetings of the Society and of its subdivisions, for the presentation and discussion of papers, or for social purposes, shall be held as authorized by the Board of Direction, and shall be open to the public except as may be ordered by the Board.

Sec. 2. Regular meetings of the Board of Direction shall be held during the fourth week of each month on call from the President.

The minutes of Board meetings shall be transcribed and sent promptly to each member of the Board.

ARTICLE VI Miscellaneous

Sec. 1. The Board may formulate rules, conforming with the Constitution and By-Laws, relating to any affairs of the Society. Such rules may be adopted at any regular meeting of the Board by the affirmative vote of a majority of the entire membership of the Board and shall take effect on adoption.

Sec. 2. In all questions involving parliamentary rules, not covered in the Constitution and By-Laws, Robert's Rules of Order shall govern.

Sec. 3. Any member who has complied with the provisions of the Constitution shall be entitled to a diploma certifying his grade of membership. It shall be signed by the President, attested by the Secretary, and bear the seal of the Society.

Sec. 4. The Society may issue badges to its members. The badges shall be of a design approved by the Board, shall bear distinguishing marks for the different grades and may have members' names and dates of membership engraved thereon. Prices of badges shall be fixed by the Board.

Sec. 5. Diplomas and badges shall be issued only on agreement providing for their return on demand of the Board in case of termination of membership.

Sec. 6. It shall be the duty of all members to call the attention of the Secretary to the improper use of the Society badge or symbols, or to claims made by nonmembers that they are members of the Society. The Secretary shall make an investigation and present the facts to the Board.

Sec. 7. The official record of the Society shall be known as the Midwest Engineer of The Western Society of Engineers. It shall be published under the direction of the Publication Committee; shall contain technical papers and discussion, and may include the Constitution, By-Laws, Rules of the Board, annual reports, the membership directory, and such other information as the Board may prescribe.

Sec. 8. The administrative year of all committees, officers of Sections and Divisions and all commissions created by the Society shall coincide with the administrative year of the Society as provided in Article X, Section 10 of the Constitution.

ARTICLE VII Amendments

Sec. 1. Any proposed amendment to these By-Laws shall be presented in writing at a regular meeting of the Board, and shall be voted upon at the next regular meeting. The Secretary shall mail a copy to each member of the Board at least fifteen days before the meeting at which action on such amendment is to be taken. An affirmative vote of two-thirds of the entire membership of the Board, obtained by letter-ballot if necessary, shall be required for adoption.

How Western Society Serves Its Members

**Dr. Gustav Egloff, Past President
Western Society of Engineers**

Universal Oil Products Company

Presented before the Engineers Council for Professional Development.

The Western Society of Engineers, founded in 1869, was the fourth engineering Society to be established in the United States. Its first president was Col. Roswell B. Mason who was elected Mayor of Chicago in the same year and served in the latter capacity during the great fire of 1871. The Society's roster includes engineers from all branches of the profession. Although headquarters are in Chicago and most of its members reside in that area, the Society has non-resident members in every section of the United States and many foreign countries. It is unique among engineering societies and has much to offer engineers of all age brackets from students to men having long records of accomplishment.

The Western Society is so organized that it fulfills five fundamental needs of the engineering profession by encouraging the advancement of:

- (1) The theory and practice of engineering
- (2) The interests of the profession
- (3) The education of its members
- (4) The interests of the community
- (5) The interests of the employer

For the purpose of advancing the theory and practice of engineering, the Society has ten sections, representing different interests, which meet to present

and discuss technical subjects. There is at least one such meeting each week from October to June. The sections include:

- (1) Bridge and Structural Engineering
- (2) Chemical and Metallurgical Engineering
- (3) Communications Engineering
- (4) Electrical Engineering
- (5) Fire Protection and Safety Engineering
- (6) Gas, Fuels and Combustion Engineering
- (7) Hydraulic, Sanitary and Municipal Engineering
- (8) Mechanical Engineering
- (9) Traffic Engineering and City Planning
- (10) Transportation Engineering

The professional interests of Western Society members are served through many committees and the operations of four divisions: (1) Consulting Engineers (2) Engineering History (3) Junior Division and (4) Professional Women's Council. In a long term program for the advancement of engineering as a profession, the Junior Division is of particular importance. This division stems from the recognition by the Society that it has a primary obligation

to aid the young graduate in becoming adjusted to his position in the scheme of things. In the development of an engineering career, the value of a professional society cannot be overemphasized. An engineering society can offer the young graduate an opportunity both to keep his technical knowledge up-to-date and to make professional contacts. Participation in society activities also gives him a sense of belonging to the profession, and as a corollary, imbues him with a professional pride. The Junior Division of the Western Society is unusually worthwhile in this respect, inasmuch as it provides for greater opportunity for self-expression and for more active participation by the younger member than would otherwise be possible.

Professional interest must also be stimulated by good publications. The Western Society has such a medium in its official journal, the *MIDWEST ENGINEER*, which is published monthly. The articles included are concerned with subjects of broad engineering interest. News of Society activities keeps the members in close touch with the work going on. Future meetings are announced and past meetings are reported upon both pictorially and in print.

To provide incentives for creative work, WSE presents three awards: the Octave Chanute Medal to a member for a paper in the field of civil, mechanical or electrical engineering; the Charles Ellet Award, to a Junior member for an outstanding paper and the Annual Cash Award, open to all members and providing a maximum of five \$100 awards for winning papers submitted in the contest.

WSE also participates with the four Founder Societies in the Alfred Noble Prize for excellence of technical papers, and the Washington Award, which recognizes preeminent service in promoting the happiness, comfort and well-being of humanity.

The Western Society provides a direct service to its members in the formulation of programs for post-collegiate training. More often than not, engineers find that they must continue with some schooling in order to attain real success and recognition. For this purpose, the Educational Committee has worked with high-grade engineering schools in the Chicago area to make appropriate night classes available.

For some time the Western Society has sponsored a refresher course at the Extension Division of the University of Illinois to assist its members in preparing for the State Professional Engineering examinations, which are prerequisite to the granting of a Certificate of Registration.

New Educational Program

A new educational program is now being worked out to remedy recognized short-comings of the average engineering education. The criticism most often directed at engineers is that they know too much of engineering, science, and mathematics, and too little of writing, speaking, economics and cultural subjects. The Society believes that the engineer must have an understanding of the contemporary world and its inhabitants in order to utilize his technical skill to the advantage of society and himself. He must be able to express his ideas to others and understand how these ideas fit into the general economic picture. It is indeed difficult for the engineer to acquire all of the background he needs in non-scientific studies during college. He has necessarily devoted a great portion of his time in

school to an acquisition of knowledge of the natural laws which are basic to his profession. For these reasons the Western Society is making it possible for the engineer to supplement his knowledge in other fields after leaving school.

The slogan for this new General Education Program is "Thinking, Reading, Speaking, Writing." Unless the engineer has developed these talents and can communicate his ideas in a coherent report to superiors and co-workers, they are not of much use to mankind or to his employer. The engineer as a business man must also carry on some correspondence and frequently write articles for technical publications. He often addresses technical meetings, and if he has civic interest truly at heart, will speak before lay groups to acquaint them with the part engineering plays in their lives. To prepare the engineer for these responsibilities, the Western Society will include in the program courses which cover effective business English, advanced letter writing, report writing, public speaking, public relations, and editing.

The Western Society, industry and the profession recognize that young engineers entering the business world need a broadened objective to develop their own futures to the maximum and to bring to their specialized engineering work a better understanding of the field of engineering as a whole and its place in business generally.

The Western Society of Engineers, therefore, has planned to provide the young engineer with an opportunity to meet and discuss with other young engineers and mature engineers who have become established in their professions. This program is designed to expand the young engineers' knowledge of engineering in the major lines of business in the community.

Leaders in the fields of utility, oil, small businesses, railroads, steel, packing houses and heavy manufacturing have been scheduled to speak at the forums.

In addition to being scientifically sound, good engineering must fit into the general economic pattern, but not many engineers have had the time nor the inclination to take courses in economics during their formal education.

After they have stumbled over a few problems in the workaday world, the need for such background becomes evident. The Western Society will, therefore, sponsor two courses in economics, one general and the other in systems of political economy. Among the subjects included in the general course will be functions and processes of economic systems; population and natural resources, methods of financing, money standards and systems, the problem of business depressions, price structures, market control policies, the distribution of income, government financial policies and a study of capitalism and collectivism.

As the engineer makes professional advancement, he is very likely to become involved in labor relations problems. If he is well grounded in the past history of the labor movement and the present theories and practices, he stands a much better chance of coping with these problems. A course, which the Western Society plans to sponsor, will cover the development of the American labor movement, elements of collective bargaining, a study of labor relations, and a study of human relations factors and supervision.

The engineer also needs to understand political science rather thoroughly, not only in the interest of being an all-around good citizen, but for the reason that many statutes have direct bearing on engineering work. Two political science courses will be offered. The first will cover the development of American political institutions and the second will be a study of the laws on engineering, property, and taxation.

Serves Civic Committee

The Western Society serves the civic interests of the community in a number of ways. The Civic committee keeps constant vigilance over civic affairs relevant to engineering. Examples of matters studied by the various subcommittees are civil service operations, registration laws, smoke abatement, building codes, and traffic problems. They are deeply concerned with all engineering problems which affect the health, operation and beauty of the city. As an engineering society of recognized high standing, Western is frequently asked to furnish members for committees of the city and state on public en-

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gineering problems. For example, a number of Western Society members are on the City Planning Commission. Members are also working on the Sag-Calumet Navigation Project which is laying plans to make the Calumet river navigable for barges.

The activities of the Western Society are also of high value to the employer of engineers. Keeping in touch with technical advances and engineering activities is a must for any company that wishes to survive. Personal contacts made at the Society are tangible factors in increasing sales and maintaining business relations. Society participation also increases morale among engineering employees. All concerned benefit from the broadening influence of contact with leading engineers whom the employee meets at Western Society headquarters.

Every purpose of the Society is served by the opening of the new Western Society headquarters early this year. It is one of the most outstanding projects in the progressive program of expanded service to the engineering and scientific professions. It is, furthermore, an important step toward the creation of an engineering and science center for the city of Chicago. These new quarters are appropriately located in the building adjacent to John Crerar Library which has an outstanding collection of technical information. Other scientific and technical groups are also locating in these buildings.

The quarters of the Western Society occupy three floors totalling about 9000 sq. ft. of space. The dining room, lo-

cated on the fifth floor, seats 175 people and is open five days a week for lunch and dinner and by special arrangement at other times. It accommodates the dinner meetings of a number of scientific and technical societies and other groups.

The sixth floor includes a lounge, bar, check-room, and staff offices. The lounge is beautifully appointed and comfortable. It serves as a gathering place for groups who are holding dinners or programs in the quarters, and its central location makes it an ideal meeting place for engineers and their families. In short, the engineers of Chicago now have a home in the loop.

On the floor above, an auditorium and other meeting rooms are provided. The auditorium is acoustically treated and well-lighted, is equipped with modern public address and picture projection systems which permit varied and effective program presentation. It is indeed a far cry from the usual hotel banquet room where acoustics are poor and someone's head is constantly bobbing up between the screen and slide projector. There are 200 comfortable theater-type seats in the auditorium and seating capacity can be increased to 300 by using the adjoining room. Otherwise this room can be used separately by a second group having 100 or less in attendance. A small conference room, suitable for a group of 20, is also located on this floor.

At present, about 45 groups are making use of the headquarters facilities. Appropriate meeting places for these

societies have been scarce and expensive, and the Western Society is pleased that it can offer such service to other societies on a cost basis.

The quarters of the Western Society required a cash outlay of \$120,000 which was contributed by members, their employers and a number of industries. The entire project, however, represents about \$200,000 in work and materials. The remaining \$80,000 was donated in the form of architectural, engineering and other services. The Society is more than pleased to report that the entire project has been paid for.

The quarters are, however, only the first step toward the goal of a full scale Engineering and Science Center. Ultimately a Center will be built which will offer complete facilities to all professional groups both large and small. Plans are to incorporate under one roof a large auditorium seating thousands, meeting rooms of various sizes, office quarters for various societies, restaurant, lounge, club room facilities, reading rooms, and the John Crerar Library. It will provide the professional people of Chicago with a meeting place where they may reap the full benefits of close association with each other. The building should also attract the national meetings of many engineering and scientific societies to Chicago, inasmuch as it will provide ideal quarters for such conventions. The proposed Center will be looked upon as a great civic service to the city of Chicago, one of the world's focal points of engineering activity and education.

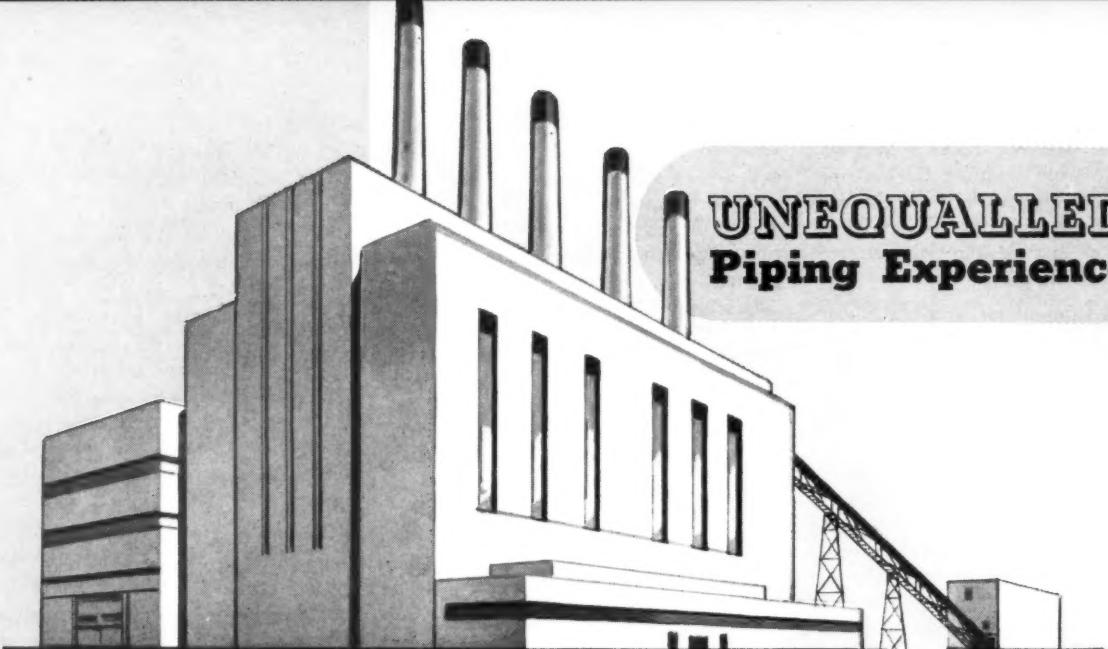


Requirements for Membership in WSE

GRADE OF MEMBERSHIP	Years of Age	Years of Experience*	Other Qualifications	References	FEES AND DUES		
					Entrance Fees	Annual Dues Res.	Non-Res.
Member.....	No Requirement	10**	Practice of Engineering.....	3 Members.....	\$20.00	\$20.00	\$13.50
Associate.....	30 to 35.....	6.....	Practice of Engineering.....	3 Members.....	15.00	15.00	10.00
Affiliate.....	Under 30.....	6.....	Practice of Engineering.....	3 Members.....	10.00	10.00	6.50
Student.....	No Requirement	2.....	Interested in Engineering.....	3 Members.....	16.50	16.50	11.50
	No Requirement	No Requirement	Engineering Student in College of recognized standing.....	Dean or Other School Authority.....	None	3.50	3.50

NOTES: *Graduation from an accredited engineering college is accepted as 6 years of experience.
**2 years of the 10 must have been in responsible charge.

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Associate Members Upon Graduation With-
out Payment Of Entrance Fee.



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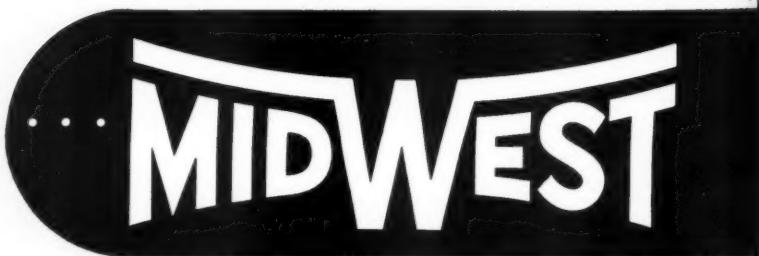
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HONOR AWARDS

The Society administers or participates in five honor awards having as their purpose the recognition of engineering accomplishment and an incentive to engineers and members of the Society to ex-

cel in preparing and presenting engineering papers. These awards are the Octave Chanute Medal established in 1901, the Washington Award in 1916, the Charles Ellet Award (for Junior Engineers) in

1929, the Alfred Nobel Prize also in 1929, and the Cash Awards in 1950. A brief outline of the purpose and conditions of each of these awards together with a list of the respective recipients follows:

Octave Chanute Medal

Octave Chanute, during his term of office as president, presented the Society with a fund to provide medals as awards for the best papers in Civil, Mechanical and Electrical engineering presented before the Society during 1901. At the close of his administration in 1902, he do-

nated a much larger fund the revenue therefrom to be applied in awards for prizes for papers read before the Society, under such conditions as the Board of Direction might determine.

During the following years medals have been awarded in General, Civil, Mechanical and Electrical engineering. The present design of the

medal was adopted in 1913 and each medal bears the profile of Mr. Chanute on one side and on the obverse side the year of the award, the name of the recipient, the branch of engineering and the date on which the paper was presented.

The awards of the Chanute medal have been made as follows:

1901	W. D. Pence—Civil Engineering J. H. Spengler—Civil Engineering A. Bement—Mechanical Engineering A. V. Abbott—Electrical Engineering
1902	J. W. Alvord—Civil Engineering R. E. Milligan—Mechanical Engineering E. B. Ellicott—Electrical Engineering
1903	A. Marston—Civil Engineering Storm Bull—Mechanical Engineering E. Gonzenbach—Electrical Engineering
1904	W. A. Shaw—Civil Engineering A. Bement—Mechanical Engineering
1905	T. L. Condron—Civil Engineering C. E. Sargent—Mechanical Engineering C. H. Smeot—Electrical Engineering
1906	G. H. Bremner—Civil Engineering W. L. Abbott—Mechanical Engineering R. F. Schuchardt—Electrical Engineering
1907	F. E. Turneaure—Civil Engineering W. T. Ray and Henry Kreisinger—Mechanical Engineering D. W. Roper—Electrical Engineering
1908	H. E. Horton—Civil Engineering A. N. Talbot—Mechanical Engineering Morgan Brooks—Electrical Engineering
1909	A. Bement—Civil Engineering O. Chanute—Mechanical Engineering R. H. Rice—Electrical Engineering

1910	C. K. Mohler—Civil Engineering C. P. Berg—Mechanical Engineering H. B. Gear—Electrical Engineering
1911	John Ericson—Civil Engineering H. Ganssen—Mechanical Engineering C. F. Burgess—Electrical Engineering
1912	Onward Bates—General Engineering D. W. Mead—Civil Engineering W. L. Abbott—Mechanical and Electrical Engineering
1913	O. H. Basquin—Civil Engineering T. V. Salt—Mechanical Engineering
1914	Andrews Allen—General Engineering Norman Stineman—Civil Engineering Hymen Eli Goldberg—Mechanical Engineering
1915	Curtis McD. Townsend—General Engineering Wilbur M. Wilson—Civil Engineering
1916	H. B. Sauerman—General Engineering Clinton B. Stewart—Civil Engineering
1917	B. H. Peck—Electrical Engineering
1924	W. A. Shaw—General Engineering John F. Hayford—Civil Engineering Paul L. Battey—Mechanical Engineering
1935-37	W. M. Wilson—Civil Engineering F. F. Fowle—Electrical Engineering

1938-39	Otto R. Jelinek—Civil Engineering Earle G. Benson—Mechanical Engineering J. Paul Clayton—Electrical Engineering
1939-40	Chas. B. Burdick—Civil Engineering A. G. Shaver—Electrical Engineering
1940-41	Paul L. Battey—Civil Engineering Gustav Egloff—Mechanical Engineering
1941-42	Lawrence T. Wyly—Civil Engineering Charles W. Gennet, Jr.—Electrical Engineering
1942-43	Sholto M. Spears—Civil Engineering Charles W. Lerch—Electrical Engineering
1943-44	John B. Jackson—Electrical Engineering
1944-45	Robert L. Anderson—Civil Engineering Frank F. Fowle—Mechanical Engineering
1945-46	Ovid W. Eshbach—General Engineering
1946-47	George C. Hillis—Communication Engineering
1947-48	Tenney S. Ford—Sanitary Engineering Albert L. Tholin—Sanitary Engineering
1948-49	Daniel V. Meiller—Mechanical Engineering
1950	Ralph J. Kochenburger (A.I.E.E.) for paper "A Frequency Response Method for Analyzing and Synthesizing Contractor Servomechanism."
1950-51	Charles E. Deleuw—Civil Engineering

Cash Awards

Beginning in 1950 the Western Society of Engineers established annual Cash Awards for the best papers submitted by members. Five prizes are authorized for distribution annually, each for \$100.

Winners are selected by an Awards Committee, which reserves the right to award less than the five established prizes or to postpone the competition if papers are not of sufficient merit. Any

member of the Society, regardless of grade of membership, is eligible. Papers should be of general interest to engineers, but neither highly technical nor of controversial nature.

Winners of Cash Awards are:

1950	C. J. McLean (1st prize)—"Measuring Circulating Water Flow by the Salt-Velocity Method." Paul Rogers (2nd prize)—"The Structural Aspects
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of Power Plant Design."

Charles A. Blessing (3rd prize)—"Surveying and Mapping for Modern City Planning."

1951

Albert L. Tholin (1st prize)—"Elevated Walkways for Downtown Chicago."

Ernest L. Abramson (2nd prize)—"The Turbine Type of Peripheral Pump."

Erwin M. Lurie (3rd prize)—"Plaster Cracks—But When?"

Washington Award

The late John W. Alvord, Past President W. S. E., in 1916 proposed the establishment of an honor award by the Society and donated a fund for its maintenance. The scope of the award was later enlarged and the name "Washington Award" adopted as a reminder that the first president was an engineer. The four "founder" engineering societies were invited to elect two representatives each to serve on the Commission of Award which also includes nine members to be selected by the Western Society of Engineers.

The purpose of the Award is the "recognition of devoted, unselfish and pre-eminent service in advancing human progress." It is conferred each year upon an engineer whose professional attainments, in the judgment of the commission, have pre-eminently advanced the welfare of mankind. Presentation of the award is made at a joint meeting of the members of the five participating societies.

The token of the Washington Award is a beautiful bronze tablet mounted on a marble

base and bearing an inscription reciting the purpose of the award, name of the recipient, the accomplishment for which it is given followed by the names of the participating societies.

Subsequent gifts by Mr. Alvord have increased the endowment to a substantial amount, enabling the award to be administered in a dignified manner. The Commission has adopted complete rules governing selection of candidates for the award and procedure in choosing the recipient. The names of the recipients and citations of the Award follow:

- 1919—**Herbert C. Hoover**, Hon. M. W. S. E., for his achievements as chairman, commission for relief of Belgium 1914-17, food administrator of the United States 1917-18.
- 1922—**Robert W. Hunt**, Hon. M. W. S. E., for his pioneer work in the development of the steel industry in the United States and for a life devoted to the advancement of the engineering profession.
- 1924—**Arthur N. Talbot**, Hon. M. W. S. E., for his life work as student and teacher, investigator and writer and for his enduring contribution to the science of engineering.
- 1925—**Jonas Waldo Smith**, for the rare combination of vision, technical skill, administrative ability and courageous leadership in engineering.
- 1926—**John Watson Alvord**, Past Pres. and Hon. M. W. S. E., for his pioneer work in developing the fundamental principles of public utility valuation and his marked contributions to sanitary science.
- 1927—**Orville Wright**, for fundamental scientific research and resultant successful airplane flight.
- 1928—**Michael Idvorsky Pupin**, for devotion to scientific research leading to his inventions which have materially aided the development of long distance telephone and radio broadcasting.
- 1929—**Bion Joseph Arnold**, Past President and Hon. M. W. S. E., for pioneering work in the engineering and economics of electrical transportation.
- 1930—**Mortimer Elwyn Cooley**, for vision and constructive leadership in the education of the engineer.
- 1931—**Ralph Modjeski**, Past President and Hon. M. W. S. E., for his contribution to transportation through superior skill and courage in bridge design and construction.
- 1932—**William David Coolidge**, for his scientific spirit and achievement in developing ductile tungsten and the modern x-ray tube.
- 1935—**Ambrose Swasey**, for his distinguished contributions as a builder of instruments, institutions and men.
- 1936—**Charles Franklin Kettering**, for his high achievements in guiding industrial research toward the greater comfort, happiness and safety of mankind in the home and on the highway.
- 1937—**Frederick Gardner Cottrell**, for his social vision in dedicating to the perpetuation of research the rewards of his achievements in science and engineering.
- 1938—**Frank Baldwin Jewett**, for inspiring and directing scientific research leading to improvements in the art of communication.
- 1939—**Daniel Webster Mead**, Hon. M. W. S. E., for his superior contribution to sound theory, good practice and high ethical standards in the creation of engineering works, as an engineer and as a teacher.
- 1940—**Daniel Cowan Jackling**, M. W. S. E., for pioneering in large-scale mining and treatment of low-grade copper ores, releasing vast resources from formerly worthless deposits.
- 1941—**Ralph Budd**, M. W. S. E., for vision and courageous leadership in advancing the technological frontiers of high speed railroad transportation.
- 1942—**William Lamont Abbott**, Past President and Honorary M. W. S. E., for advancing the standards of the engineering profession, for aiding combustion research.
- 1943—**Andrey Abraham Potter**, for distinguished leadership in engineering education and research and patriotic service in mobilizing technical knowledge for victory in war and peace.
- 1944—**Henry Ford**, for pioneer development of mass production of low cost automotive transportation which revolutionized the way of life of mankind.
- 1945—**Arthur Holly Compton**, Hon. M. W. S. E., for his research and teaching in the physical sciences, increasing man's knowledge of the action of x-rays and cosmic rays.
- 1946—**Vannevar Bush**, for outstanding leadership in organizing and directing scientific resources of the nation toward victory in World War II.
- 1947—**Karl Taylor Compton**, for progressive administration of engineering education for leadership in research and for advancement of American industry in technology.
- 1948—**Ralph Edward Flanders**, for high technical skill in perfecting the tools of industry and for distinguished service in the field of human relationships.
- 1949—**John Lucian Savage**, for unselfish public service devoted to the creation of monumental hydraulic structures utilizing natural resources.
- 1950—**Wilfred Sykes**, M.W.S.E., for invention of electrical machines and steel processes for advances in industrial administration and cooperation for counsel to state and college.
- 1951—**Edwin Howard Armstrong**, for outstanding inventions basic to radio transmission and reception, and notable service to his country.

Charles Ellet Award

This award was established in 1929 by a gift from E. C. Shuman, a Junior member, who suggested the name "Charles Ellet Award" as a memorial to that young engineer of Civil War days whose undaunted determination to succeed in the face of overwhelming disappointments outlived the struggle for recognition.

The award is symbolized by a beautiful loving cup on which is engraved, the name of the recipient and the names of their schools. The cup

is on display in the Society's headquarters. As evidence of the honor bestowed, the winner receives an engraved certificate and a prize of \$25.

The award is made periodically to a member under 30 years old, who, in the opinion of a committee of awards, is adjudged to have excelled in the preparation and presentation of a technical paper presented in competition for this award at a meeting of the Junior Engineers.

The recipients of this honor have been:

- 1930—**John D. Burle**—Purdue University.
1932—**Francis E. Wolosewick**—Armour '27.
1933—**Joseph Kuchko**.
1934—**Irving J. Kadic**—Chicago Tech. '27.
1935—**Grover C. Lewis**—Illinois '30.
1936—**Robert W. Suman**—Armour '34.
1937—**George A. Nelson**—Armour '35.
1939—**Raymond V. McGrath**—Univ. of Washington '35.
1940—**Ray F. Erickson**.
1950—**Donald R. Klusman**—Washington University, '48.

Alfred Noble Prize

The Alfred Nobel Prize was established in 1929 and consists of an award from the income of a fund contributed by engineers and others to perpetuate the name and accomplishments of Alfred Nobel, Past President of both the Western Society of Engineers and the American Society of Civil Engineers. The prize consists of a cash award, allowance for travel expense and a certificate

signed by the president and secretary of the American Society of Civil Engineers, which society is trustee of the fund.

The award is open to any member, not past his thirty-first birthday, of the Western Society or any of the four "founder" engineering societies and is given for a technical paper of particular merit on any subject accepted for publica-

tion by any of the foregoing five societies.

The recipient of the prize is selected annually by a committee composed of one representative from each of the five societies. The award is made at a general meeting of the society of which the recipient is a member.

The Alfred Nobel Prize has been awarded as follows:

1931—C. T. Eddy (A. I. M. E.), for paper, "Arsenic Elimination in the Reverberatory Refining of Native Copper."

1932—Frank M. Starr (A. I. E. E.), for paper "Equivalent Circuits."

1933—Claude Maxwell Stanley, Jr. (A. S. C. E.), for paper "Study of Stilling-Basin Design."

1936—Abe Tilles (A. I. E. E.), for paper "Spark Lag of the Sphere Gap."

1937—G. M. L. Sommerrman (A. I. E. E.), for Paper "Properties of Saturants for Paper-Insulated Cables."

1938—Ralph J. Schilthuis (A. I. M. E.), for paper "Connate Water in Oil and Gas Sands."

1939—Claude E. Shannon (A. I. E. E.) for paper "A Symbolic Analysis of Relay and Switching Circuits."

1941—Robert F. Hayes, Jr. (A. I. E. E.), for paper "Development of the Glow Switch."

1942—George W. Dunlap (A. I. E. E.), for paper "The Recovery Voltage Analyzer for Determination of Circuit Recovery Characteristics."

1943—Dr. Benjamin J. Lazan (A. S. M. E.), for paper "Some Mechanical Properties of Plastics and Metals Under Sustained Vibrations."

1944—W. R. Wilson (A. I. E. E.), for paper "Corona in Aircraft Electric Systems as a Function of Altitude."

1945—A. L. Ahlf (A. S. C. E.) for paper "Design Constants for Beams with Nonsymmetrical Straight Haunches."

1946—Martin Goland (Jr. A. S. M. E.), for paper "The Flutter of a Uniform Cantilever Wing."

1947—John H. Hollomon (A. I. M. E.), for paper "The Mechanical Equation of State."

1948—Robert L. Hoss (A. I. M. E.), for paper "Calculated Effect of Pressure Maintenance on Oil Recovery."

1949—John C. Fisher (A. S. M. E.), for "Anisotropic Plastic Flow."

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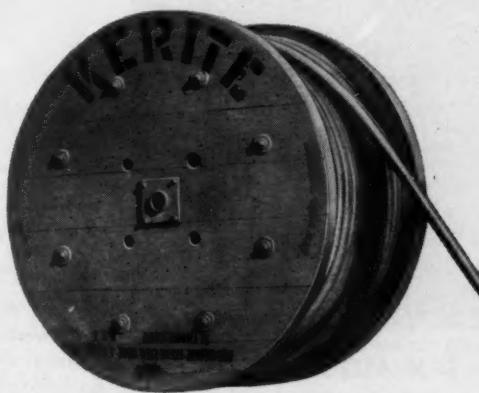
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Donald N. Becker is Chief Structural Engineer with A. J. Boynton and Co., and before that was Engineer of Bridge Design for the City of Chicago for 24 years. He graduated from Rensselaer Polytechnic Institute with the degree of Civil Engineer.

Mr. Becker joined WSE in 1920 and has served as a Director and Chairman of the Bridge and Structural Engineering section. He has been Chairman of the Attendance and Admissions committees, and has served on the Library, Fellowship and Civic committees. He is now sponsor of the Junior Division. He served as a Trustee Treasurer and First Vice President.

OVID W. ESHBACH First Vice-President

Ovid W. Eshbach has been dean of Northwestern University's Technological Institute since 1939. After receiving his Bachelor's and Master's degrees from Lehigh, Brooklyn Polytech and M.I.T., he served as engineer and personnel advisor for Pennsylvania Bell Telephone and A.T.&T. in New York. He is the editor of "Handbook of Engineering Fundamentals."

Dean Eshbach has served on the Education Washington Awards, and Development committees. He has been a representative on the Engineering Societies Personnel Service Advisory Committee and for two years chairman of this group.





CHARLES E. DE LEUW Second Vice President

Charles E. DeLeuw has been president of Charles E. DeLeuw and Co., for the past 20 years. He joined the firm, then known as Kelker, Gates and DeLeuw, as engineer in 1919. Previously he was an engineer with Ewing and Allen, Chicago, and resident engineer and draftsman for the City of Chicago. He received his Bachelor and Civil Engineering degrees from the University of Illinois.

Mr. DeLeuw joined WSE in 1931 and has served as director of the Hydraulic, Sanitary and Municipal Section, the Consulting Engineering Division and the Traffic Engineering and City Planning Section. He was a Trustee in 1947-50 and in 1951 received the Octave Chanute Medal.



J. EARL HARRINGTON Executive Secretary

Mr. Harrington was graduated from Illinois Institute of Technology with a B. S. degree in Chemical Engineering. In 1939 he received the professional degree of Chemical Engineer from the same school. He was engaged for 12 years as chemical engineer for the Bureau of Engineering, City of Chicago. During World War II he was consultant and engineering coordinator for the Quartermaster General and later served as Chief of the High Explosives Manufacturing and Raw Materials Divisions of the Explosives Branch of the Ordnance Department.

Mr. Harrington joined the Western Society of Engineers in 1937 and was a director and chairman of the Chemical and Metallurgical Section.



JOHN F. SULLIVAN, JR. Treasurer

John F. Sullivan, Jr., is manager of construction, Commonwealth Edison Co., and Public Service Co. of Northern Illinois. After receiving his engineering degree from the University of Wisconsin, Mr. Sullivan worked with General Electric Co., and then joined the Edison company in 1925.

Mr. Sullivan joined The Western Society of Engineers in 1928. He is past president of the Illinois Engineering Council and a member of the American Society of Mechanical Engineers. Mr. Sullivan has been and is now a member of the Mechanical section of WSE.

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(Continued from Page 15)

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The Story Behind the Society's Seal



Although all members of the Western Society of Engineers have seen the Society's Seal countless times, perhaps few of the new ones—and some of the old ones—know the interesting background of how the Seal came about and what it stands for.

The story of our Seal begins on March 7, 1882, when Vice President D. C. Cregier appointed a three-man committee to seek designs from among W.S.E.'s membership. Slightly more than two months later, this committee was able to report that it had selected the design submitted by G. A. M. Liljencrantz as the most appropriate one and that it had been approved by the Trustees. The very speed with which the Seal was designed and approved indicates that even in its early days our Society got things done rapidly.

The committee then asked Mr. Liljencrantz to prepare a detailed description of his design. Here is what he wrote:

"It has been the aim of the designer to indicate by appropriate emblems, as far as space and other circumstances would allow, the different branches of engineering represented in the Society, and some of the fundamental branches on which the manifold works of our profession are based.

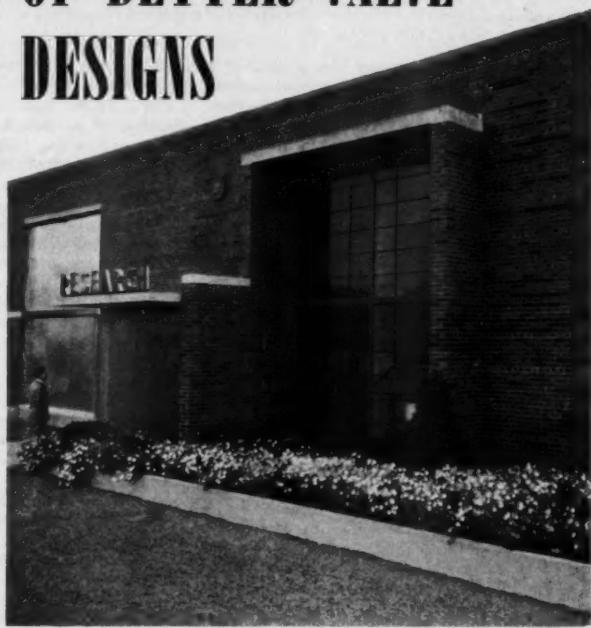
"Thus, the suspension bridge, the sounding party, and 'Polaris,' the guiding star for those who seek the true meridian, and its assistant, the 'Dipper,' are emblematical of the Civil Engineers. The Mining Engineers are represented by some of their working tools, the sledge, the pick and the drill; while the castle and the cogwheel are the universally adopted emblems of the Military and Mechanical Engineers, respectively.

"These several designs are inclosed in the four fields produced by the construction of the famous 47th problem of Euclid, probably the most prominent and useful problem in geometry, therefore this has been deemed the most appropriate representative of that important branch of science.

"Algebra and higher mathematics, the calculus, are also represented by well known signs pertaining to these branches.

"Finally, the motto, 'Per ardua ad metam,' which translated means, 'Through Difficulties to the Aim,' intended to indicate the universal purpose of all the different branches of the engineering profession, has been given in Latin, not to intimate thereby that this is the language with which the representatives of our profession are most familiar, but in the first place to get a comprehensive expression in a most condensed form; secondly, to make it more professional in appearance and, finally, because, if I am permitted to use a common phrase, 'They all do it.' "

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CODE OF ETHICS

Formulated by the Engineers' Council for Professional Development, and adopted by the Board of Direction of the Western Society of Engineers, November, 1948.

Also adopted by the following national societies:

American Institute of Consulting Engineers, American Institute of Electrical Engineers, American Institute of Industrial Engineers, American Society of Civil Engineers, American Society for Engineering Education, American Society of Mechanical Engineers, as well as many local organizations in various cities and states.

Honesty, justice and courtesy form a moral philosophy which, associated with mutual interest among men, constitutes the foundation of ethics. The engineer should recognize such a standard, not in passive observance, but as a set of dynamic principles guiding his conduct and way of life. It is his duty to practice his profession according to these Canons of Ethics.

As the keystone of professional conduct is integrity, the engineer will discharge his duties with fidelity to the public, his employees and clients, and with fairness and impartiality to all. It is his duty to interest himself in public welfare, and to be ready to apply his special knowledge for the benefit of mankind. He should uphold the honor and dignity of his profession and avoid association with any enterprise of questionable character. In his dealings with fellow engineers he should be fair and tolerant.

Professional Life

SEC. 1. The engineer will cooperate in extending the effectiveness of his engineering profession by interchanging information and experience with other engineers and students and by contributing to the work of engineering societies, schools and the scientific and engineering press.

SEC. 2. He will not advertise his work or merit in a self-laudatory manner, and he will avoid all conduct or practice likely to discredit or do injury to the dignity and honor of his profession.

Relations with the Public

SEC. 3. The engineer will endeavor to extend public knowledge of engineering, and will discourage the spreading of untrue, unfair and exaggerated statements regarding engineering.

SEC. 4. He will have due regard for the safety of life and health of public and employees who may be affected by the work for which he is responsible.

SEC. 5. He will express an opinion only when it is founded on adequate knowledge and honest conviction while he is serving as a witness before a court, commission or other tribunal.

SEC. 6. He will not issue ex parte statements, criticisms or arguments on matters connected with public policy which are inspired or paid for by private interests, unless he indicates on whose behalf he is making the statement.

SEC. 7. He will refrain from expressing publicly an opinion on an engineering subject unless he is informed as to the facts relating thereto.

Relations with Clients and Employers

SEC. 8. The engineer will act in professional matters for each client or employer as a faithful agent or trustee.

SEC. 9. He will act with fairness and justice between his client or employer and the contractor when dealing with contracts.

SEC. 10. He will make his status clear to his client or employer before undertaking an engagement if he may be called upon to decide on the use of inventions, apparatus, or any other thing in which he may have a financial interest.

SEC. 11. He will guard against conditions that are dangerous or threatening to life, limb or property on work for which he is responsible, or if he is not responsible, will promptly call such

conditions to the attention of those who are responsible.

SEC. 12. He will present clearly the consequences to be expected from deviation proposed if his engineering judgment is overruled by non-technical authority in cases where he is responsible for the technical adequacy of engineering work.

SEC. 13. He will engage, or advise his client or employer to engage, and he will cooperate with, other experts and specialists whenever the client's or employer's interests are best served by such service.

SEC. 14. He will disclose no information concerning the business affairs or technical processes of clients or employers without their consent.

SEC. 15. He will not accept compensation, financial or otherwise, from more than one interested party for the same service, or for services pertaining to the same work, without the consent of all interested parties.

SEC. 16. He will not accept commissions or allowances, directly or indirectly, from contractors or other parties dealing with his client or employer in connection with work for which he is responsible.

SEC. 17. He will not be financially interested in the bids as or of a contractor on competitive work for which he is employed as an engineer unless he has the consent of his client or employer.

SEC. 18. He will promptly disclose to his client or employer any interest in a business which may compete with or affect the business of his client or employer. He will not allow an interest in any business to affect his decision regarding engineering work for which he is employed, or which he may be called upon to perform.

Relations with Engineers

SEC. 19. The engineer will endeavor to protect the engineering profession collectively and individually from misrepresentation and misunderstanding.

SEC. 20. He will take care that credit for engineering work is given to those to whom credit is properly due.

SEC. 21. He will uphold the principle of appropriate and adequate compensation for those engaged in engineering work, including those in subordinate capacities, as being in the public interest and maintaining the standards of the profession.

SEC. 22. He will endeavor to provide opportunity for the professional development and advancement of engineers in his employ.

SEC. 23. He will not directly or indirectly injure the professional reputation, prospects or practice of another engineer. However, if he considers that an engineer is guilty of unethical, illegal or unfair practice, he will present the information to the proper authority for action.

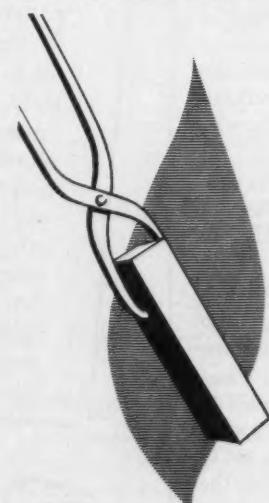
SEC. 24. He will exercise due restraint in criticizing another engineer's work in public, recognizing the fact that the engineering societies and the engineering press provide the proper forum for technical discussions and criticism.

SEC. 25. He will not try to supplant another engineer in a particular employment after becoming aware that definite steps have been taken toward the other's employment.

SEC. 26. He will not compete with another engineer on the basis of charges for work by underbidding, through reducing his normal fees after having been informed of the charges named by the other.

SEC. 27. He will not use the advantages of a salaried position to compete unfairly with another engineer.

SEC. 28. He will not become associated in responsibility for work with engineers who do not conform to ethical practices.



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Juhnke, Paul B.
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Kellenberger, K. E.
Kelly, E. J.
King, P. W.
Kinney, Wm. M.
Knehans, William H.
Knight, Robert
Kobylanski, Joseph L.
Krahl, William F.
Kuhn, Francis H.
Lacher, Walter S.
Lane, F. H.

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Lewis, Samuel R.
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Thompson, M. D.
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The following list contains the names and last known information of all members corrected to September 1, 1951.

After each name is an abbreviation showing the year in which each became a member and his present grade. In these abbreviations HM, is for honorary member; M, member; A, associate; S, student and Aff, affiliate.

City and state has been omitted for all Chicago addresses.

A

- Abbott, Earl G.** ('51,M), Dist. Mgr., General Electric Co., 840 S. Canal, 80.
Abbott, F. J. ('48,M), Sr. Cost Analyst, Commonwealth Edison Co., 72 W. Adams, 90.
Abmeyer, A. S. ('40,M), Div. Plant Supv., Ill. Bell Tel. Co., 208 W. Washington, 6.
Abramson, Ernest L. ('51,M), Dev. Eng., Aurora Pump Co., 619 Loucks, Aurora, Ill.
Ackerman, Robert H. ('47,M), Eng. in Chg. of Field, Holland, Ackerman & Holland, 20 N. Wacker, 6.
Acton, V. S. ('45,M), Mgr., Steel Mill Sec., Westinghouse Elec. Corp., Mdse. Mart, 54.
Adam, George H. ('46,M), Traffic Eng., Ill. Bell Tel. Co., 212 W. Washington, 6.
Adams, Anton F. ('51,Aff.), Supv. Draftsman, Ill. Bell Tel. Co., 215 W. Randolph, 6.
Adams, Harry H. Jr. ('36,M), V.P. Sales, Hannifin Corp., 1101 S. Kilbourn, 24.
Adler, Geo. H. ('24,M), Asst. Div. Oper. Supt., Public Service Co. of No. Ill., 1701 S. 1st, Maywood, Ill.
Adler, Howard R. ('44,M), Mgr., National Biscuit Co., 240 Main, Marseilles, Ill.
Ahern, John J. ('45,M), Prof. and Dir., Fire Protection and Safety Engrg., Ill. Inst. of Tech., 3300 S. Federal, 16.
Ahlin, Nolan C. ('49,A), Draftsman, Ill. Bell Tel. Co., 725 Chicago, Hammond, Ind.
Ahlstrom, Edwin ('10,LM), Const. Eng., 1004 Baltimore, Kansas City 6, Mo.
Ahlstrom, Ernest ('51,M), Struct. Eng., Graham, Anderson, Probst & White, 80 E. Jackson, 4.
Ahlstrom, Walter ('48,M), Supt., Commonwealth Edison Co., 72 W. Adams, 90.
Allara, Ronald C. ('49,A), 10440 S. Hamlin, 43.
Albert, Edward R. ('40,M), Eng. Mgr., Vern E. Alden Co., 120 S. LaSalle St.
Albright, Geo. M. ('48,M), V.P. and Chief Eng., Powers-Thompson Construct. Co., 27 S. Chicago, Joliet, Ill.
Alday, Ralph R. ('47,A), TV Analyzer, Admiral Corp., 3800 W. Cortland St., Chicago 47.
Alden, Vern E. ('36,M), Sr. Gen. Partner, Vern E. Alden Co., 120 S. LaSalle, 3.
Aldridge, John A. ('50,M), Dir. of Research, Sears Roebuck & Co., 925 S. Homan, 7.
Alexander, Edward K. ('50,M), Sales Eng., U. S. Steel Supply Co., 1319 Wabansia Ave., 22.
Alexander, John A. ('49,A), Proj. Eng., E. I. DuPont Co., Kennedy Ave., East Chicago, Ind.
Alford, Thomas E. ('40,M), Supv., Bldg. Plans and Specs., Ill. Bell Tel. Co., 208 W. Washington St., 6.
Allegratti, Aldo ('40,M), Chief of Dept., Western Electric Co., Hawthorne Works, 23.
Allen, Arthur G. ('48,M), Eng., Ill. Bell Tel. Co., 131 N. Franklin St., 6.
Allen, Clark N. ('47,M), Eng., Ill. Bell Tel. Co., 208 W. Washington St., 6.
Allen, E. G. ('45,M), Spec. Eng., The Atchison, Topeka & Santa Fe R.R., 80 E. Jackson Blvd., 4.
Allen, Edward ('49,M), Midwest Ed. "Electrical World," McGraw-Hill Co., 520 N. Michigan, 11.
Allison, Orval ('50,M), Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.

- Almcrantz, Embert H.** ('50,M), Ind. Eng., Electrical Windings, Inc., 2015 N. Kolmar, 39.
Altpeter, Walter G. ('29,M), Sup., Panel Shops, Western Electric Co., Inc., Hawthorne Works, 23.
Ammerman, John M. ('51,M), Dir. of Engrg., Pressed Steel Car Co., Inc., 6 N. Michigan, 2.
Anda, L. S. ('30,M), Owner, L. S. Anda Engrg. Service, P.O. Box 144, Neshkord, Wis.
Anderson, Arthur ('19,M), Special Asst. Eng., New York Central System, LaSalle St. Station, 5.
Anderson, Bert W. ('40,M), Eng. of Toll Plans & Est., Ill. Bell Tel. Co., 215 W. Randolph St., 6.
Anderson, Bolton G. ('45,M), Fire Prot. Eng., Marsh & McLennan, Inc., 231 S. LaSalle St., 4.
Anderson, Carl A. ('36,M), Civil Engr., Ill. Div. of Highways, 160 N. LaSalle, 1.
Anderson, Ernst H. ('51,M), Elec. Eng., L. E. Myers Co., 53 W. Jackson Blvd., 4.
Anderson, Fred S. ('51,M), Dial Equip. Eng., Ill. Bell Tel., 208 W. Washington, 6.
Anderson, H. A. ('39,M), Eng., Sunbeam Corp., 4432 W. Ogden, 23.
Anderson, James S. ('35,M), Ch. Eng., Robert G. Regan Co., 25 N. Ottawa St., Joliet, Ill.
Anderson, Joseph J. ('48,M), Traffic Programs Eng., Ill. Bell Tel. Co., 212 W. Washington St., 6.
Anderson, Oscar E. ('28,M), Supt. of Const., Commonwealth Edison Co., 72 W. Adams St., 90.
Anderson, Peter K. ('43,M), Sec'y., Gawley Construction Co., Inc., 7643 S. Kedzie Ave., 20.
Anderson, Ralph W. ('50,A), Jr. Civil Eng., State of Calif., Dept. of Pub. Wks., 150 Oak St., San Francisco.
Anderson, Robert E. ('52,S), Eng., International Harvester Co., 180 N. Michigan Ave., 1.
Anderson, Robert Howard ('37,M), Sr. Eng., C. K. Willett, 317 N. Galena Ave., Dixon, Ill.
Anderson, Robert L. ('31,M), Supt. Public Works and Village Eng., Village of Winnetka, Village Hall, Winnetka, III.
Anderson, Roy H. ('46,M), Staff Eng., Deleuw, Cather & Co., 150 N. Wacker Dr., 6.
Anderson, Russell E. ('48,M), V.P., Delta Star Electric Co., 2437 Fulton St., 12.
Anderson, Sydney C. Ill. ('50,A), In Service, 305 Thayer St., Evanston, Ill.
Andrews, Edward L. ('43,M), Mach. Designer Stewart-Warner Corp., 1826 Diversey Ave., 14.
Andrews, Francis E. ('36,M), Eng. Elect. Transmission & Distribution Design, Public Service Co. of No. Ill., 72 W. Adams St., 90.
Andrews, Fred O. ('40,M) Studies Eng., Ill. Bell Tel. Co., 208 W. Washington St., 6.
Andrews, James H. ('36,M), Arch'l. Eng., Wm. F. Thornton & Associates, 108 N. Dearborn St., 2.
Anning, Harold E. ('45,M), Pres., Anning-Johnson Co., Inc., 1514 W. Van Buren St., 7.
Anschuetz, Jack F. ('49,Aff.), Mgr. Press Div., Stanco Welder & Mchy. Co., 9 S. Clinton, 6.
Appleby, Joseph, Jr. ('46,A), Sales Eng., J. R. Rudolph & Assoc., 1951 Irving Park, 13.
Archbold, M. J. ('26,M), Eng., Mech. Design, Public Service Co. of No. Ill., 72 W. Adams St., 90.

Arenberg, Albert L. ('20,LM), Pres., Luminator, Inc., 120 N. Peoria St., 7.
Armbrust, George M. ('05,LM), 1123 North Shore Ave., 26.

Arms, Leo M. ('24,M), Asst. Mgr. High. & Mun. Bur., Portland Cement Assoc., 33 W. Grand, 10.

Armstrong, E. A. ('24,M), Mgr. Indust. Sales, Public Service Co. of No. Ill., 72 W. Adams, 3.

Armstrong, F. C. ('51,M), Asst. Div. Oper. Supt. Pub. Service Co. of No. Ill., 22 W. Cass St., 10.
Armstrong, H. G. ('18,LM), 6951 N. Ionia Ave., 30.

Armstrong, J. B. ('48,M), Eng., Powers-Thompson Construction Co., 27 S. Chicago St., Joliet, Ill.
Armstrong, Richard E. ('48,A), Eng., Northern Ind. Public Service Co., Hammond, Ind.

Armstrong, W. Scott ('20,LM), Pres. & Treas. W. Scott Armstrong Co., 109 N. Dearborn, 2.

Arn, W. G. ('19,LM), Retired, Box 1013, Mobile 6, Ala.

Arnold, George G. ('27,M), Eng., Ill. Bell Tel. Co., 131 N. Franklin, 6.

Aroston, Milton S. ('47,M), Dir. Health & Safety, U.S. Atomic Energy Comm., P.O. Box 6140A, Chi. 80.

Artman, Mrs. Margaret E. ('48,M), Eng. Ill. Bell Tel. Co., 208 W. Washington, 6.

Asherman, A. A. ('48,M), Asst. Supt., Commonwealth Edison Co., 72 W. Adams, 90.

Ashley, Clifford A. ('20,LM), Owner, Wells Engineering Co., 11 S. 2nd-St., Geneva, Ill.

Ashwell, Miss Iris ('48,M), Sr. Planner Supt., Chi. Housing Auth., 608 S. Dearborn, 5.

Asmann, Edwin N. ('47,M), Gen. Supv. of Statistics, Ill. Bell Tel. Co., 208 W. Washington, 6.

Atkins, Dale B. ('45,M), Apprentice Dir., Carnegie-Ill. Steel Corp., N. Broadway, Gary, Ind.

Auck, Dale K. ('50,M), Fire Prevention Eng., Federation of Mutual Fire Ins. Cos., 919 N. Michigan, 11.

Auscher, Albert ('47,M), Elec. Design, A. J. Boynton & Co., 109 N. Wabash Ave., 2.

Auty, K. A. ('20,LM), Retired, 2000 Lincoln Park W., 14.

Ayers, Thomas G. ('50,Aff.), Mgr., Indust'l Relations, Public Service Co. of No. Ill., 72 W. Adams, 90.

Ayshford, Loren C. ('48,M), Const. Maint. Tools Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.

B

Bacon, Robert H. ('46,M), Pres., R. H. Bacon & Co., 343 S. Dearborn, 4.

Badger, Robert E. ('49,A), Elec. Eng., Hubbard & Co., 5401 W. Roosevelt Rd., 50.

Bagley, James. ('49,A), Sr. Mech. Draftsman, Chi. Park Dist., 425 E. 14th Blvd., 5.

Baier, Peter J. Jr. ('49,S), Sales Eng., Henry Stuckart, 2519 S. Archer, 8.

Bailey, A. D. ('19,LM), Retired.

Bailey, George G. ('48,M), Div. V.P., Public Service Co. of No. Ill., 22 W. Cass St., Joliet, Ill.

Bailey, George R. ('46,M), Gen. Mgr., Albert H. Wetten & Co., 141 W. Jackson, 4.

Bailey, Melville D. ('48,M), Div. Dial Coordinator, Ill. Bell Tel. Co., 6317 S. Maryland, 37.

Baker, Albert ('49,S), Civil Eng. I, State of Ill. Div. of Highways, 160 N. LaSalle, 1.

Baker, Irwin H. ('43,M), Chief Eng., S. A. Healy Co. & P. Kiewit Sons' Co., 330 S. Dearborn, 4.

Baker, John S. ('38,M), V.P., Cook Electric Co., 2700 Southport, 14.

Bakhshi, S. R. ('20,M), Eng. Dept., C.R.I. & P. R.R. Co., 4931 N. Washburn Ave., 25.

Bakken, Arne S. ('20,M), Supv. Surveyor, Commonwealth Edison Co., 72 W. Adams St., 90.

Baldwin, Edward T. ('47,M), Dept. Chief, Teletype Corp., 1400 Wrightwood Ave., 14.

Baldwin, John N. ('47,M), Meter Engr., Commonwealth Edison Co., 140 S. Dearborn, 3.

- Balkin, Louis ('29,M), Pres.-Treas., L. Balkin Builder, Inc., 3610 S. Albany Ave., 32.
- Balkin, Stuart ('47,M), Sec'y., L. Balkin Builder, Inc., 1325 W. Webster Ave., 14.
- Ball, C. E. ('46,M), Construction Supv., Chicago Park District, 425 E. 14th Blvd., 5.
- Ball, John C. ('46,M), Supv., Refinery Engineering Co., P.O. Box 1977, Tulsa 1, Okla.
- Ball, John F. ('48,A), Met. Handling Eng., Ball Engineering Co., 6601 Olmsted, 31.
- Ball, John P. ('03,LM), Retired, 2514 E. 73rd Pl., 49.
- Ballenger, W. M. ('43,M), Dist. Mgr. Eng. Div., General Electric Co., 840 S. Canal St., 80.
- Ballinger, Walter E. ('43,M), Eng., Bucyrus Erie Co. Monighan Div., 931 N. Kilpatrick Ave., 51.
- Bank, Martin L. ('48,M), Asst. Supt., Overhead Div., Commonwealth Edison Co., 2233 S. Throop, 8.
- Banks, William Henry ('45,Aff.), City Foreman, Western Union Tele. Co., 1029 W. Adams, 7.
- Banta, John S. ('20,LM), Retired, 930 Hickory St., Waukegan, Ill.
- Barker, J. D. ('17,LM), Div. Constr. Eng. Missouri State Highway Dept., Macon, Mo.
- Barber, Wilfred B. ('51,M), Div. Indust'l Relations Mgr., Public Service Co. of No. Ill., 22 W. Cass St., Joliet, Ill.
- Barbieri, Joseph F., Jr. ('50,A), 520 Austin, Park Ridge, Ill.
- Barclay, Wm. O. ('46,M), 21st Giddeon, Zion, Ill.
- Bardwell, Allen E. ('44,M), Western Div. Mgr., Fabreka Products Co., 325 W. Huron St., 10.
- Baring, John W. ('45,M), Asst. Ch. Testing Eng., Commonwealth Edison Co., 2233 S. Throop St., 8.
- Barker, Lawrence, B. ('19,LM), Eng. of Constr., Sanitary District of Chicago, 910 S. Michigan Ave., 5.
- Barlow, James T. ('50,A), Jr. Designer, Larimore & Douglas, Inc., 78 E. Adams St., 3.
- Barmack, B. J. ('35,M), Sr. Eng., Line Design Div., Commonwealth Edison Co., 72 W. Adams St., 90.
- Barnes, Harold I. ('46,M), Draftsman, American Bridge Co., Gary Plant, Gary, Ind.
- Barnett, Mrs. E. Frances ('48,M), Struct. Designer, Dept. Filtration Design, City of Chi., 220 S. State, 4.
- Barnett, James W. ('49,A), Sales Eng., Lindberg Engrg. Co., 2450 W. Hubbard, 12.
- Barr, Frank C. ('48,M), Supv.-Wiring Inspect., Commonwealth Edison Co., 852 W. 63rd St., 21.
- Barrows, William C. ('50,S), 21 Hillcrest Rd., Glen Ridge, N. J.
- Barts, D. D. ('48,M), Struct. Eng., Holabird & Root & Burgee, 180 N. Wabash Ave., 1.
- Barth, Anton J. ('39,M), Consult. Eng., S. S. Solitt & Co., 307 N. Michigan, 1.
- Bartlett, George S. ('46,M), Mgr. of Engrg., Public Service Co. of No. Ill., 72 W. Adams, 90.
- Bartz, Harry J. ('36,M), Sr. Civil Eng., Sanitary Dist. of Chi., 627 Abbottsford Rd., Kenilworth, Ill.
- Basler, George R. ('20,M), Design Eng., Cargill, Inc., 200 Grain Exch., Minneapolis 15, Minn.
- Bassett, James J. ('19,LM), 118 Forest Blvd., Park Forest, Chicago Heights, Ill.
- Batchelder, W. O. ('20,LM), 76 E. Monroe, 3.
- Bates, Alan ('50,M), Managing Eng., Chicago Electric Mfg. Co., 6333 W. 65th St., 38.
- Bates, A. Allan ('49,M), V.P., Portland Cement Assoc., 33 W. Grand, 10.
- Bates, Sidney E. Jr. ('47,M), Mech. Eng., Bates Engrg. Works, 1550 Dayton St., 22.
- Bates, Walter A. Jr. ('43,M), V.P., Walter Bates Co., Inc., 500 Mills Rd., Joliet, Ill.
- Bates, Walter A. Sr. ('28,M), Pres., Walter Bates Co., Inc., 500 Mills Rd., Joliet, Ill.
- Battey, Paul L. ('10,LM), Sr. Partner, Battey & Childs, 231 S. LaSalle, 4.
- Batty, R. W. ('50,M), Expeditor, Freyn Engrg. Co., 109 N. Wabash, 2.
- Bauer, Conrad A. ('36,M), Supv. Eng. Commonwealth Edison Co., 72 W. Adams, 90.
- Bauer, Leslie L. ('50,M), Struct. Eng., 8 S. Michigan Ave., 3.
- Bauerschmidt, Gerald J. ('48,M), Supv. Commonwealth Edison Co., 72 W. Adams, 90.
- Baugher, G. William ('51,A), Struct. Eng., A. J. Boynton & Co., 109 N. Wabash, 2.
- Baumel, Ervin ('47,M), Supv., Ill. Bell Tel. Co., 212 W. Washington, 6.
- Bautz, Harry S. ('50,A), Sales Eng., Pittsburgh-Corning Corp., 205 W. Wacker Dr., 6.
- Bautz, Fredrick ('36,M), Production Research Eng., Internat'l Harvester Co., 1015 W. 120th St., 43.
- Baxter, George M. ('51,M), Constr. Eng., Gerhardt F. Meyne Co., 7 S. Dearborn, 3.
- Baylor, John R. ('27,M), Eng. of Water Purification, Dept. of Pub. Works, City of Chi., 3300 E. Chiltenham, 49.
- Baylor, C. L. ('47,M), Village Eng., Village of Downers Grove, 1041 Burlington, Downers Grove, Ill.
- Beal, Henry C. ('29,M), V.P., Western Electric Co., Inc., 195 Broadway, New York 7, N. Y.
- Beard, Earl G. ('50,M), Civil Eng. IV., Dept. of Subways & Superhighways, 20 N. Wacker Dr., 6.
- Beattie, C. Stuart ('48,M), V.P., Delta-Star Elec. Co., 2437 Fulton, 12.
- Becher, Donald F. ('49,A), In service.
- Bechtolt, P. Robert ('42,A), Asst. Supt., Schedules, Western Actuarial Bureau, 222 W. Adams St., 6.
- Becker, August E. ('46,Aff.), Sales Eng., Chicago Steel Foundry Co., 3720 S. Kedzie, 32.
- BECKER, DONALD N. ('20,LM,President), Chief Struct. Eng., A. J. Boynton & Co., 109 N. Wabash, 2.
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- Bilek, Robert F. ('46,M), Jr. Traffic Eng., Chi. Park Dist., 425 E. 14th Blvd., 5.
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Burkey, Mack G. ('23,M), Real Estate Appraiser, First National Bank of Chi., 38 S. Dearborn St., 3.

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Burns, James J. ('28,M), Eng., Public Service Co. of No. Ill., 1001 S. Taylor Ave., Oak Park, Ill.

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Bushman, Andrew K. ('36,M), Mgr., Application, Serv. & Const. Engrg. Divs., General Electric Co., 1 River Road, Schenectady 5, N. Y.

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Caldwell, Joseph, Jr. ('48,M), Sr. Section Eng., Jefferson Electric Co., 25th & Madison Sts., Bellwood, Ill.
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Carlisle, Kenneth G. ('28,Aff), Testing Eng., Public Service Co. of No. Ill., 1701 S. First Ave., Maywood, Ill.
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Carlson, William C. ('44,M), Div. Plt. Supt., Ill. Bell Tel. Co., 6317 Maryland, 37.
Carnahan, L. H. ('47,M), Gen. Supt., Holabird & Root & Burgee, 180 N. Wabash Ave., 1.

Carr, J. Roland ('43,M), Assoc. Editor, "Engineering News-Record," McGraw-Hill Publishing Co., 520 N. Michigan, 11.
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Cartland, Silas ('48,M), Cons. Eng., 111 W. Washington, 2.
Carver, Francis T. ('28,M), Mat'l. Test. Eng., Commonwealth Edison Co., 2233 S. Throop St., 8.
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Casad, M. W. ('36,M), Equip. & Bldg. Eng., Ill. Bell Tel. Co., 212 W. Washington, 6.
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Clark, A. B. ('19,LM), Power Eng., United Engrs. & Constructors, 1401 Arch St., Phila. 5, Pa.
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- Eden, Miss Catherine W.** ('50,M), Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
- Eilers, Baldwin C.** ('28,M), Prin. Asst. Sew. Designer Bur. of Sewers, City of Chicago, 188 W. Randolph St., 1.
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- Enquist, E. B.** ('40,M), Asst. Eng., Commonwealth Edison Co., 72 W. Adams, 90.
- Ennis, Donald E.** ('49,A), Chgo. Dist. Mgr., Piston Ring Dept., Koppers Co., Inc., 122 S. Michigan, 3.
- Enright, Neil F.** ('48,M), Plant Supv., Ill. Bell Tel. Co., 212 W. Washington, 6.
- Ephgrave, John O.** ('36,M), Partner, Victor Chemical Works, Chicago Heights, Ill.
- Epstein, A.** ('19,LM), Pres., A. Epstein & Sons, Inc., 2011 W. Pershing, 9.
- Epstein, Hirsch E.** ('43,M), Pres. Advance Transformer Co., 1122 W. Catalpa, 40.
- Epstein, Raymond** ('49,M), V.P., A. Epstein & Sons, Inc., 2011 W. Pershing, 9.
- Epstein, Sidney** ('49,M), Secy., A. Epstein & Sons, Inc., 2011 W. Pershing, 9.
- Erdal, Ingolf** ('20,LM), Retired, Rt. 3, Box 450 Koontz Lake, Walkerton, Ind.
- Erickson, Donald H.** ('46,M), Eng., Ill. Bell Tel. Co., 1025 Sunnyside, 40.
- Erickson, Harry A.** ('41,M), Chief Eng., D. A. Stuart Oil Co., Ltd., 2727 S. Troy, 23.
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- Erickson, Clarence E.** ('48,M), Secy., Henry Erickson Co., 228 N. LaSalle, 1.
- Erickson, Dewey A.** ('48,M), V.P., Henry Erickson Co., 228 N. LaSalle, 1.
- Erjvac, Anthony J.** ('48,A), Engrg. Records Clerk, Ford Motor Co., A.E.D., 7401 S. Cicero Ave., 29.
- ESHBACH, OVID W.** ('41,M, 1st V.P.), Dean of Engrg., Northwestern Uni. Technological Inst., Evanston, Ill.
- Esmiol, Clifford F.** ('46,M), 10510 Calumet, 28.
- Essington, Harry M.** ('30,M), Elec. Eng. in Chg. Power, C.T.A., 79 W. Monroe, 90.
- Essman, Arthur L.** ('49,M), Chief Signal Eng., Burlington Lines, 547 W. Jackson, 6.
- Euler, Fred C.** ('47,M), Chief Eng., Chicago Athletic Assn., 12 S. Michigan, 3.
- Euston, Jacob H.** ('50,M), V.P. & Secy., Business Research Corp., 105 S. LaSalle, 3.
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- Everhard, E. P.** ('26,M), V.P., Wm. A. Pope Co., 26 N. Jefferson, 6.
- Everly, Robert**, ('46,M), Supt. of Parks, Glencoe Park Dist., Village Hall, Glencoe, Ill.
- Ewald, Leonard E.** ('48,M), Supt. Wiring-Insp. Div., Commonwealth Edison Co., 72 W. Adams, 90.
- Ewers, Ernest A.** ('40,M), Spec. Practices Eng., Ill. Bell Tel. Co., 212 W. Washington, 6.
- Ewing, Gerald E.** ('40,A), Radio Sales & Eng., Montgomery Ward & Co., 311 S. Morris, Bloomington, Ill.
- Eyer, R. F.** ('36,M), Power Eng., Public Service Co. of No. Ill., 1701 S. 1st Ave., Maywood, Ill.
- F
- Fabri, Roger S.** ('50,M), Appraisal Eng., Coats & Burchard Co., 4415 N. Ravenswood, 14.
- Fahey, William M.** ('48,S), 1310 Albion, 26.
- Fairbairn, W. J.** ('34,M), Special Research Eng., Factory Insur. Assoc., 175 W. Jackson, 4.
- Fairhall, W. M.** ('32,M), Apt. H. Bldg., 1109 Sells Ave., Columbus 12, Ohio.
- Fajnor, Edward** ('48,S), 4704 N. Kilbourn, 30.
- Fako, Paul** ('48,M), Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
- Fallon, Bernard J.** ('20,LM), 105 W. Madison, 2.
- Farquhar, John Jr.** ('50,A), Eng., Peabody Coal Co., 231 S. LaSalle, 43.
- Farrell, Fred** ('25,M), Mfrgs. Rep., 3741 Center Point Rd., Cedar Rapids, Ia.
- Farrelly, J. L.** ('36,M), Arch. Eng., Bd. of Education, Chi., 228 N. LaSalle, 1.
- Faville, Frederick A.** ('47,M), Pres., Faville-LeVally Corp., 105 W. Adams, 3.
- Feddele, Melvin E.** ('36,M), Pres., Cemasco Floor Co., 228 N. LaSalle, 1.
- Feeley, Bernard T.** ('50,M), Sales Eng., Webster Mfg., Inc., 343 S. Dearborn, 4.
- Fehr, Gordon W.** ('50,M), Dist. Plant Eng., Ill. Bell Tel. Co., 131 N. Franklin, 6.
- Felsenthal, David S. Jr.** ('49,A), Valuation Eng., Marshall & Stevens, 53 W. Jackson, 4.
- Fencl, Richard G.** ('38,M), Asst. Traffic Eng., Chi. Park Dist., 425 E. 14th Blvd., 5.
- Ferguson, Farley S.** ('26,M), Supv. Eng., Struct. Div., 2970 Sheridan, 14.
- Ferguson, L. A. Jr.** ('28,M), Mgr., Public Rel., Commonwealth Edison Co., 72 W. Adams, 90.
- Ferguson, Lester M.** ('48,M), Civil Eng., Sinclair Refining Co., 3500 Indianapolis Blvd., East Chicago, Ind.
- Ferguson, William B.** ('38,M), Elec. Eng., Freyn Engrg. Co., 109 N. Wabash, 2.
- Fetters, Donald W.** ('47,M), V.P., Berhardt F. Meyne Co., 7 S. Dearborn, 3.
- Ficarratto, Sado C.** ('33,M), Struct. Eng., U. S. Eng. Office, 222 W. North Bank, 54.
- Field, E. A.** ('31,M), Eng., Field Control Div., H. D. Conkey & Co., Mendota, Ill.
- Field, H. H.** ('20,LM), Public Service Co. of No. Ill., 72 W. Adams, 90.
- Field, Jack L.** ('49,M), Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
- Filippi, Gottlieb**, ('13,LM), 10844 Edbrooke, 28.
- Filippi, Hugo** ('20,LM), V.P. & Secy., Ill. Brick Co., 228 N. LaSalle, 1.
- Finch, Raymond A.** ('49,M), Equip. Eng., Western Electric Co., Hawthorne Sta., 23.
- Findlater, William E.** ('20,LM), Struct. Eng., American Bridge Co., 208 S. LaSalle, 90.
- Finger, William A.** ('50,M), Hydraulic Eng., Marsh & McLennan, Inc., 231 S. LaSalle, 4.
- Fink, Minor H.** ('45,M), Dist. Plant Eng., Ill. Bell Tel. Co., 5643 Broadway, 40.
- Finlay, Samuel** ('36,M), Eng., Goodman Mfg. Co., 4834 S. Halsted, 9.
- First, Joseph J.** ('50,M), Chem. Eng., Vern E. Alden Co., 120 S. LaSalle, 3.
- Fischer, David J.** ('49,M), Partner, David Architectural Iron Works, 2019 Walnut, 12.
- Fischer, F. W.** ('89,LN), 9226 Phillips, 17.
- Fischer, Paul O.** ('35,M), Zoning Eng., Chi. Regional Planning Assoc., 79 W. Monroe, 3.
- Fisher, Hardin Y.** ('49,M), 428 Geneva, Hillside, Ill.
- Fitch, James C.** ('28,M), Asst. Supt. Struct. & Mech. Dev., Commonwealth Edison Co., 72 W. Adams, 90.
- Fitts, Joel A.** ('22,M), Sales Eng., Electric Storage Battery Co., 5335 S. Western, 9.
- Fitzgerald, Thos. C.** ('36,M), Machine Designer, Western Elec. Co., Hawthorne Sta., 23.
- Fitzpatrick, James V. Jr.** ('50,S), 3421 S. Parnell, 16.
- Fitzpatrick, John P.** ('39,M), Sr. Eng., Argonne National Lab., P. O. Box 5207, 80.
- Fixman, Isadore M.** ('44,M), Elec. Eng., Hub Elec. Co., 2219 W. Grand, 12.
- Fixmer, Hugh J.** ('08,LM), Asst. Eng., in Chg., Bur. of Sts., City Hall, 2.
- Fizzell, James A.** ('39,M), Chief Products Eng., III. Testing Labs., Inc., 420 N. LaSalle, 10.
- Flanagan, Joseph H.** ('50,M), Mdse. Mgr., Standard Oil Co., 910 S. Michigan, 20.
- Fletcher, Edgar N.** ('40,M), City & Cons. Eng., Municipal Bldg., Des Plaines, Ill.
- Fletcher, Quigley** ('50,M), Proj. Eng., DeLeuw, Cather & Co., 106 Mercer St., Hightstown, N. J.
- Flinn, Walter H. Jr.** ('48,M), Genl. Personnel Supv., Ill. Bell Tel. Co., 212 W. Washington, 6.
- Flint, Arthur N.** ('49,M), Power Supv., Public Service Co. of No. Ill., 423 Childs, Wheaton, Ill.
- Flisak, Edward** ('50,S), 5657 S. Throop, 36.
- Flood, Paul E.** ('48,A), Sales Eng., Precision Scientific Co., 3737 W. Cortland, 47.
- Flood, Raymond J.** ('50,M), Eng., Contracting & Material Co., 1235 Dodge, Evanston, Ill.
- Flook, L. R.** ('29,M), Planning Eng., Argonne National Lab., P.O. Box 351, LaGrange, Ill.
- Floor, Erik** ('26,M), Owner, Erik Floor & Assoc., 139 N. Clark, 2.
- Forrentine, Frank D.** ('47,M), Owner, Monarch Elec. Co., 6316 S. California, 29.

Floyd, Wm. H. III ('36,M), Elec. Eng., Installations, HQ. U. S. Air Force, Pentagon, Washington 25, D. C.
 Foit, Otto L. ('41,M), 2517 S. Avers Ave., 23.
 Foley, James L. Jr. ('49,M), Traf. Eng., Chi. Plan Comm., City Hall, 2.
 Folta, Miss Marie C. ('50,Aff), Secy., Bingham Pump Co., 407 S. Dearborn, 5.
 Ford, Clem C. ('20,LM), Cons. Eng., Jeffrey Mfg. Co., 307 N. Michigan, 1.
 Ford, Howard E. ('46,Aff), Div. V.P., Public Service Co. of No. III., 1701 S. 1st, Maywood, Ill.
 Ford, Tenney S. ('17,LM), Eng., Sewer Const., City of Chi., Bur. of Sewers, City Hall, 2.
 Forecki, Raymond P., Layout Draftsman, ('51,A), Freyn Engineering Co., 109 N. Wabash, 2.

Foschinbaur, Leonard A. ('46,M), Mgr., Engrg. Dept., Marsh & McLennan, Inc., 231 S. LaSalle, 4.
 Fosco, Alfred, ('45,M), Asst. Eng., Chi. Park Dist., 425 E. 14th Blvd., 5.
 Fosnot, Harold R. ('46,M), Dist. Sales Mgr., Graver Tank & Mfg. Co., 332 S. Michigan, 4.
 Foster, Albert W. ('49,A), Sales Eng., Tri-State Eng. Service, Box 2092, Charlotte, N. C.
 Foster, Edmond R. ('43,M), Sr. Eng., Jackson & Moreland, Park Sq. Bldg., Boston 14, Mass.
 Foster, Edson E. ('49,Aff), Prod. Supv., Ill. Bell Tel. Co., 208 W. Washington, 6.
 Foster, James A. ('49,M), Highway Economist, Portland Cement Assn., 33 W. Grand, 10.
 Fowler, E. J. ('11,M), Box 140, R. 1, Oshkosh, Wis.

Fowler, Gordon C. ('24,M), Div. Mgr., Commer. Sales, Public Service Co. of No. III., Box 278, Glencoe, Ill.

Fowler, Myron M. ('04,LM), Retired, 715 N. Kenilworth, Oak Park, Ill.

Fowler, Ralph R. ('34,M), Apparatus Eng., Automatic Elec. Co., 1033 W. Van Buren, 7.

FOX, E. GORDON, ('21,LM), Past Pres., V. P. Freyn Engrg. Co., 109 N. Wabash, 2.

Fox, John P. ('46,M), Eng. Tech. Oper. Dept., Public Service Co. of No. III., 1701 S. 1st, Maywood, Ill.

Fragomen, Austin T. ('50,M), Dist. Erection Supt., The Babcock & Wilcox Co., 105 S. LaSalle, 3.

Frame, Richard P. ('29,M), Civ. Eng., Holabird & Root & Burgee, 180 N. Wabash, 1.

Frandsen, N. P. ('03,LM), 37 Overlook Dr., Pittsburgh 16, Pa.

Franquist, E. E. ('28,M), Dist. Plan. Eng., Ill. Bell Tel. Co., 5643 Broadway, 40.

Frank, Joseph W. ('47,M), Met. Eng., Argonne National Lab., DuPage County Site, Ill.

Franzen, C. Edward ('43,M), Arch., 4825 N. Meade, 30.

Frazer, H. W. ('50,M), Dist. Eng., Infilco, Inc., 325 W. 25th Pl., 16.

Fredrick, F. G. ('36,M), Asst. Div. Eng., I. H. B. Ry., Gibson, Hammond, Ind.

Fredrick, Theodore C. ('44,M), V.P. DeLeuw, Cather & Co., 150 N. Wacker, 6.

Freely, James A. ('43,M), Dist. Plant Supt., Ill. Bell Tel. Co., 111 N. Franklin, 6.

French, Charles J., Jr. ('50,A), Cleveland Builders Supply Co., 1276 W. Third St., Cleveland 13, O.

Friedlaender, W. V. ('40,M), Research Eng., Universal Atlas Cement Co., Buffington Sta., Gary, Ind.

Fries, John M. ('49,M), Eng., Hendricks Engrg. Corp., 6544 Sheridan, 26.

Friessner, Walter E., ('51,A), Dev. Eng. Squad Leader, Continental Indus. Engrs., 176 W. Adams, 3.

Fritch, Louis C. ('10,LM), Retired, 2609 Iroquois, Wilmette, Ill.

Froh, Walter E. ('50,M), V.P., Hecker & Co., 59 W. Marquette, 21.

Fromm, Arthur C. ('50,M), V.P.-Chief Eng., Lloyd Thomas Co., 4411 Ravenswood, 40.

Frost, Oscar ('36,M), Dist. Eng., Div. of Highways, State of Ill., Mt. Hawley, Peoria, Ill.

Fruchtel, Joseph H. ('46,M), Const. Supt., Kraft Foods Company, 500 Peshigo, 90.

Fry, August J. ('19,LM), 1324 Rosedale, 40.

Fry, O. E. ('48,Aff), Asst. to Div. V.P., Public Service Co. of No. III., 1701 S. First, Maywood, Ill.

Fucik, E. James ('02,LM), Retired, 2767 S. Deere Park, Highland Park, Ill.

Führer, Max ('37,M), Eugene & Max Führer, 120 S. LaSalle, 3.

Fuller, D. William ('48,M), Pres. D. William Fuller Co., 2320 E. 75th St., 49.

Fuller, Fred C. ('51,M), Ill. Bell Tel. Co., 212 W. Washington, 6.

Fussell, Lynn E. ('50,A), 311 Highland Dr., Fountain City, Tenn.

Futrell, W. D. ('40,M), Tele. Equip. Eng., Western Elec. Co., Inc., Hawthorne Sta., 23.

G

Gabbard, Louis C. ('48,M), Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.

Gadzala, John L. ('49,A), Field Eng., Internat'l Harvester Co., 2927 W. 39th Pl., 32.

Gaensslen, Carl A. ('13,LM), 655 Roscoe, 13.

Gallagher, Edward V. ('51,S), 2638 N. Lamon, 39.

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 Garrett, P. B. ('45,M), Editor, Electrical Publs., Inc., 22 E. Huron, 11.
 Garrison, Chas. K. ('46,M), V.P., Chicago Steel Foundry Co., 3720 S. Kedzie, 32.
 Gartin, John L. ('51,M), Chief Eng., Solar-Sturges Mfg. Div., Pressed Steel Car Co., Inc., Melrose Park, Ill.
 Gartz, Louis H. ('49,A), Time Study Man, Soren Mfg. Corp., 9555 W. Eden, Schiller Park, Ill.
 Gates, L. Dean ('48,M), V.P., The L. E. Myers Co., 53 W. Jackson, 4.
 Gauthier, Clarence J. ('50,M), Eng., Public Service Co. of No. Ill., 615 Eastern, Bellwood, Ill.
 Gayman, Bert A. ('07,LM), Retired, 1840 Elmwood, Burlingame, Cal.
 GEAR, HARRY B. ('07, LM, HM, Past Pres.) Retired, 10018 Bell, 43.
 Gearhart, Creed E. ('51,M), CH. Eng., Products Pipeline Dept., Standard Oil Co. (Ind.), 910 S. Michigan, 80.
 Gehle, Fred C. ('43,Aff), Chemist, Western Elec. Co., Inc., Hawthorne Sta., 23.
 Gellert, Louis W. ('45,M), San. & Htg. Eng., Skidmore, Owings & Merrill, 100 W. Monroe, 3.
 Genkinger, Herman N. ('23,M), Elect. Foreman, Public Service Co. of No. Ill., Greenwood, & Lake Mich., Waukegan, Ill.
 Gerber, Arthur U. ('20,LM), Cons. Arch. & Struc. Eng., C.T.A., 79 W. Monroe, 3.
 Gerber, Winfred D. ('10,LM), Retired, 625 Almora, Coral Gables, Fla.
 Gerdes, William F. ('30,M), Pres., Michelmann Steel Construction Co., 137 N. Second, Quincy, Ill.
 Gerlach, Ernest R. ('51,A), Transp. Eng., C.T.A., 79 W. Monroe St., 90.
 Gerlach, Howard P. ('48,M), Assist. Proj. Mgr., North Atlantic Constructors, 61 Broadway, New York, 6, N. Y.
 Germanos, Emil G. ('51,A), 1729 N. 75th Ave., Elmwood Park, 35.
 Geyer, Robert C. ('46,M), Asst. Eng., Bldg. Design, Public Service Co. of No. Ill., 72 W. Adams, 90.
 Gibson, Floyd D. ('46,M), Supv. Eng., Commonwealth Edison Co., 72 W. Adams, 90.
 Gifford, Robt. L. ('97,LM), 1231 S. El Molino Ave., Pasadena 5, Calif.
 Gilbert, H. C. ('20,M), Pres., Gilbert-Hodgmann, Inc., 327 S. LaSalle, 4.
 Giles, Arthur G. ('24,M), Consult. Eng., Municipal Engrg. Co., 188 W. Randolph, 1.
 Gilkey, Prof. H. J. ('20,LM), Hd., Dept of Theo., Applied Mech., Iowa State College, Ames, Ia.
 Giller, Clyde E. ('41,M), Bldg. Plans & Specs. Eng., Ill. Bell Tel. Co., 212 W. Washington, 6.
 Giller, William C. ('46,M), Eng., Ill. Bell Tel. Co., 212 W. Washington, 6.
 Gillespie, S. E. ('39,M), Pres., Western Railroad Supply Co., 2428 S. Ashland, 8.
 Gilman, Brice E. ('43,M), Staff Eng., Standard Oil Co. (Ind.), 2400 New York, Whiting Ind.
 Gilman, Turner W. ('40,M), 746 S. Lyman, Oak Park, Ill.
 Gilroy, Edward ('20,LM), Retired, 9649 S. Hamilton, 43.
 Gilruth, James C. ('40,Aff), Secretary, Ill Hwy. Users Conference, 30 N. LaSalle, 2.
 Girard, Peter F. ('36,M), Sewer Design Eng., Sanitary Dist. of Chi., 910 S. Michigan, 5.
 Glab, Bruno P. ('50,A), Draftsman, Internat'l Harvester Co., 2626 W. 31st, 8.
 Gleick, J. T. ('30,M), Asst. to V.P., Podbielnak, Inc., 341 E. Ohio, 11.
 Glenn, Miss Terry ('51,A), Jr. Eng., Yeomans Bros. Co., 939 W. North, 22.
 Glentzer, Kenneth V. ('50,M), Radio & Spec. Serv. Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
 Gnaedinger, John P. ('46,A), Secy-Treas. & Dir., Soil Testing Services, Inc., 4520 W. North, 39.
 Goekman, Edward C. ('49,A), Asst. Plant Eng., Chi. Rotoprint Co., 4601 W. Belmont, 41.
 Godfrey, Charles E. ('46,M), Eng., American Brake Shoe Co., 109 N. Wabash, 2.
 Goetz, Edwin W. ('20,M), Pres., Goetz Elevator Co., 1338 W. Washington, 7.
 Goetz, Martin H. ('28,M), Elec. Eng., Pierce Elec. Co., 367 Adams, 6.
 Goetz, Maurus T. ('43,M), Prod. Dev. Eng., Teletype Corp., 1400 Wrightwood, 14.
 Goldberg, Harry M. ('50,M), Specif. Eng., Childs & Smith Arch., 20 N. Wacker, 6.
 Goldberg, Isadore, ('50,M), Pres. Goldberg & O'Brien Elec. Co., 17 S. Jefferson, 6.
 Goldberg, Morton E. ('50,A), Dev. Eng., Condenser Products Co., 1369 N. Branch, 22.
 Goldman, Bennett F. ('43,M), Chief Eng., The Nichols Engrg. Co., 3816 Grand, 51.
 Goldsby, Fred L. ('42,M), Foreign Erect. Mgr., Chi. Bridge & Iron Co., 165 Broadway, New York 6, N. Y.
 Goldstein, Sol L. ('49,A), 1903 S. Kedzie, 23.
 Gonnerman, H. F. ('27,M), Asst. to V.P. for Research & Dev., Portland Cement Assn., 33 W. Grand, 10.
 Goodell, Floyd K. ('43,M), Struct. Eng., American Bridge Co., 208 S. LaSalle, 4.
 Goodell, Stanley E. ('47,M), Sec. Eng., Commonwealth Edison Co., 72 W. Adams, 90.
 Goodman, E. M. ('22,M), Bldg. Comm., City of Evanston, 1025 Lake, Evanston, Ill.
 Goodman, Hal W. ('29,M), Civil Eng., State of Ohio, Box 103, Lucasville, O.
 Goodman, Wm. E. ('24,M), Pres., Goodman Mfg. Co., 4834 S. Halsted, 9.
 Goodwin, L. Reeves, ('20,M), 338 8th LaGrange, Ill.
 Gordnier, Leonard L. ('46,M), Dist. Plant Eng., Ill. Bell Tel. Co., 6317 Maryland, 37.
 Gordon, Bruce A. ('47,M), Owner, Bruce A. Gordon Co., 1 N. LaSalle, 2.
 Gordon, Emanuel M. ('50,A), Const. Eng., The Dennis Company, 3159 W. Roosevelt, 12.
 GORDON, F. G. ('28,LM,Past Pres.), Asst. City Eng., Dept. of Public Works, 220 S. State, 4.
 Gordon, John J. ('40,M), 6839 Yale, 21.
 Gore, G. D. ('41,M), Head, Dept. of Math. and Eng. Science, Roosevelt College, 430 S. Michigan, 5.
 Goss, H. A. ('28,M), Mech. Eng., Sargent & Lundy, 140 S. Dearborn, 3.
 Gossett, E. J. ('36,M), Pres., Bell & Gossett Co., 8200 Austin, Morton Grove, Ill.
 Gosswin, O. H. ('20,LM), Tech. Serv. Mgr., Universal Atlas Cement Co., 208 S. LaSalle, 90.
 Gough, William I. ('24,M), Civil Eng. 9332 Stewart, 20.
 Gouglas, J. H. ('28,M), 107 W. 114th St., 28.
 Gould, Harry, ('36,M), Struct. Eng., Cook County Highway Dept., 160 N. LaSalle, 1.
 Graf, William Jr. ('48,M), Des., Bell System. Home: Rt. 1, Box 343, Wheaton, Ill.
 Graf, William F. ('32,M), Cons. Eng., Wm. A. Graf & Son, 3257 W. 61st, 29.
 Graham, Ira E. ('49,A), Safety Eng., Employers Mutuals of Wausau, 228 N. LaSalle, 1.
 Graham, Lloyd D. ('46,M), 5314 N. Olcott, 31.
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 Granert, Gordon T. ('50,A), Signal Draftsman, C.R.I.P.R.R., LaSalle St. Sta., 5.
 Grant, Richard J. ('39,M), Sr. Eng., Commonwealth Edison Co., 72 W. Adams, 90.
 Grant, Steven M. ('51,A), Maint. Supervisor, University of Chicago, 5831 University, 37.
 Grasse, Paul O. ('51,A), Turn Foreman, Alloy Bar Dept., U. S. Steel Co., South Wks., 3426 E. 89th St., 17.
 Graves, Charles T. ('49,M), Asst. Chief Eng.-Tank Car Div., Gen'l. Amer. Transportation Corp., 131 S. Wabash, 3.
 Gray, Kline ('27,M), Dist. Sales Mgr., Ward Leonard Elec. Co., 53 W. Jackson, 4.
 Gray, Walter B. ('43,M), Chief Struct. Eng., Holabird & Root & Burgee, 180 N. Wabash, 1.
 Graybill, K. W. ('34,M), V.P. & Chief Eng., Automatic Elec. Co., 1033 W. Van Buren, 7.
 Greeley, Samuel A. ('19,LM), Partner, Greeley and Hansen, 220 S. State, 4.
 Green, DeWitt C. ('28,M), Fundamental Plans Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
 Green, George E. ('43,M), Undergrnd. Cable Eng., Commonwealth Edison Co., 140 S. Dearborn, 3.
 Green, Ralph ('20,M), Contracting Eng., Chi. Bridge & Iron Co., 332 S. Michigan, 4.
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 Greenhill, Harold ('20,M), Pres., Wm. P. Greenhill & Son, Inc., 500 W. Division, 10.
 Greenstein, Jerome, ('48,S), 1357 N. Homan, 51.
 Gregory, Warren R. ('49,S), Sales Asst., Westinghouse Elect. Corp., 20 N. Wacker, 6.
 Gridley, F. R. ('24,M), Internat'l Harvester Co., 180 N. Michigan, 1.
 Griesel, Margaret F. ('48,M), Retired, 1348 Cornelius, 13.
 Griffenhagen, E. O. ('11,LM), Sr. Partner, Griffenhagen & Assoc., 333 N. Michigan, 1.
 Griffenhagen, Paul F. ('30,M), P. F. Griffenhagen, 333 N. Michigan, 1.
 Griffin, Sidney P. ('28,M), Design Eng., Public Service Co. of No. Ill., 72 W. Adams, 90.
 Griffith, Leonard F. ('46,A), 1412 Fairfield, Glen-dale, Calif.
 Griffiths, Kenneth J. ('48,M), Plant Eng., Ill. Bell Tel. Co., 5643 Broadway, 40.
 GRINTER, L. E. ('37,M,Trustee), Reas. Prof. Civil Eng. & Mech., Ill. Inst. of Tech., 3300 Federal, 16.
 Gritschke, Elmer R. ('23,M), Owner, E. R. Gritschke & Assoc., 11 S. LaSalle, 3.
 Groepper, Gerald W. ('46,M), Eng., Ill. Bell Tel. Co., 212 W. Washington, 6.
 Gross, Paul C. ('50,M), Construct. Supt., J. T. Ryerson & Son, 2558 W. 16th, 8.
 Gross, Ralph F. ('38,M), Transit & Traf. Eng., Chi. Comm. on Local Trans., 309 W. Jackson, 6.
 Gross, Ralph R. ('50,S), 1119 N. Harding, 51.
 Grossman, Frank ('50,Aff), Sales Rep., Glamorgan Pipe & Foundry Co., 122 S. Michigan, 3.
 Grove, Robert ('49,A), Stud. Eng., C.T.A. 79 W. Monroe, 90.
 Grover, Earle W. ('19,M), Retired, 11131 S. Hoyne, 43.
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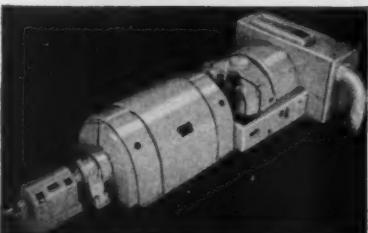
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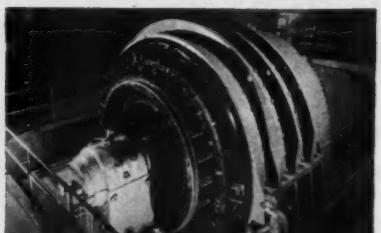
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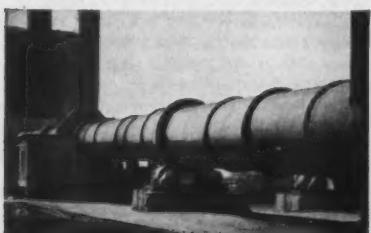
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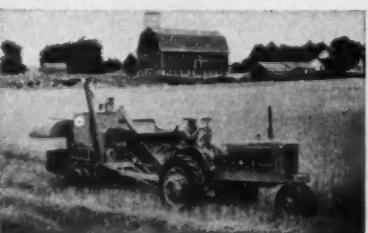
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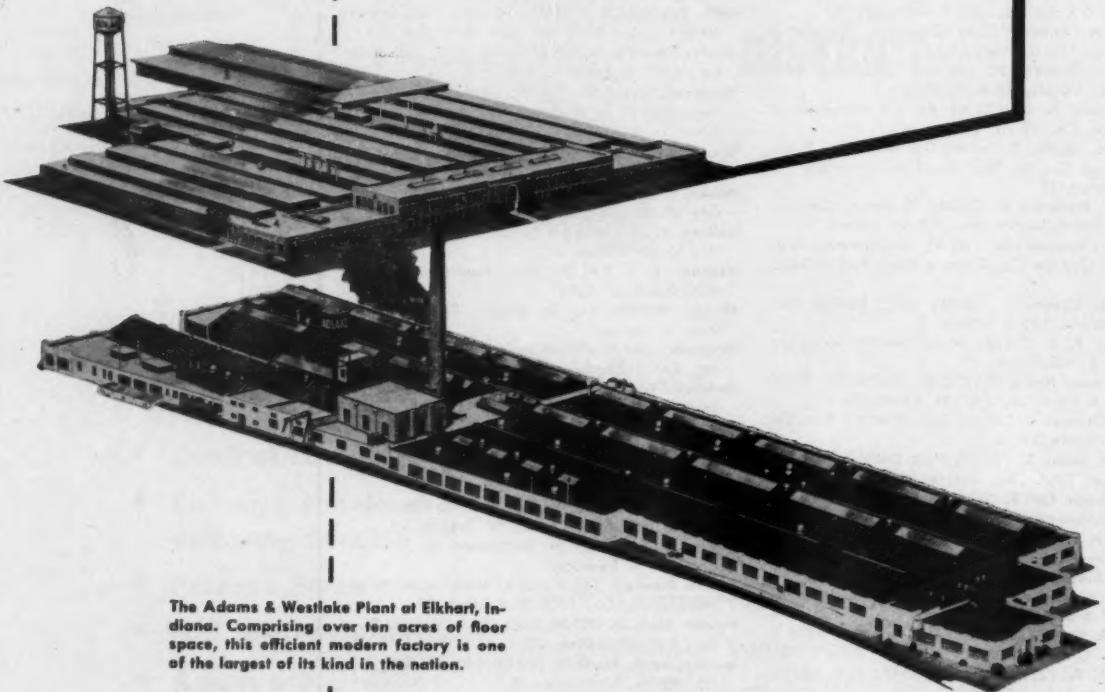
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- Jaedike, Marshall F. ('38,M), Inspec. Engrg., Pittsburgh Testing Lab., 411 N. LaSalle, 5.
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- Jaques, Cleoyce A. ('28,M), Asst. to Elect. Eng., Public Service Co. of No. Ill., 72 W. Adams, 90.
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- Jenks, Clarence A. ('28,M), Owner, C. A. Jenks & Co., 343 S. Dearborn, 4.
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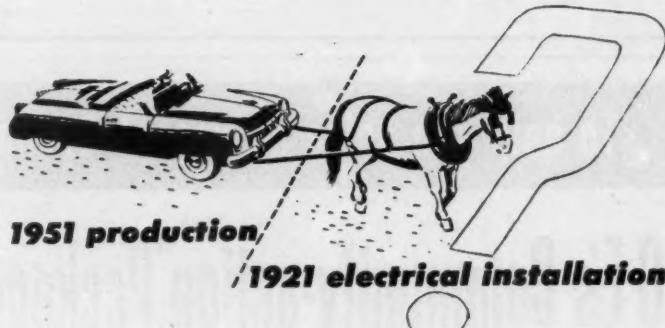
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- Jolesch, Walter L.** ('46,M), Traffic Planning Supv. Chicago Park Dist., 425 E. 14th, 5.
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- Jorgenson, Axel C.** ('47,M), Indust. Eng., Commonwealth Edison Co., 5601 So. Lowe, 21.
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- Juhnke, P. B.** ('19,LM), Chm. Bd., Rural Transformer, 632 N. 8th, Milwaukee 3, Wis.
- Julian, Victor H.** ('28,M), Retired, 8805 S. Michigan, 19.
- Junkins, John N.** ('46,M), Consult. Chem. Eng., Johnson & Johnson, 111 W. Washington 2, and Tech. Dir., Central Farmers Fertilizer Co., 608 S. Dearborn, 5.
- Jusenius, Fred H.** ('31,M), Sales Eng., Kennedy-Van Saun Mfg. & Eng. Corp., 2 Park Ave., New York, N. Y.
- Just, James W.** ('47,M), Eng., Underwriter's Lab., Inc., 207 E. Ohio St., 11.
- K
- Kaar, Howard W.** ('43,M), Struct. Eng., G. O. Neumann & Co., 790 Broadway, Gary, Ind.
- Kahan, Leonard** ('49,S), 912 Carmen, 40.
- KAHLER, WILLIAM V.** ('38,M, Past Pres.), Pres. Ill. Bell Tel. Co., 212 W. Washington, 6.
- Kaindl, Arthur M.** ('33,M), Struct. Eng., City of Chicago, 139 N. Clark, 2.
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- Kaufman, Morris B.** ('47,M), Asst. Eng., C.M. St. Paul & P. Ry. Co., 2599 W. Grand, 12.
- Kavanaugh, Wm. R.** ('51,M), Asst. Eng., Bureau of Sewers, City of Chgo., City Hall, 2.
- Kawiecki, Chester J.** ('48,A), Asst. Eng., Commonwealth Edison Co., 2233 S. Throop, 8.
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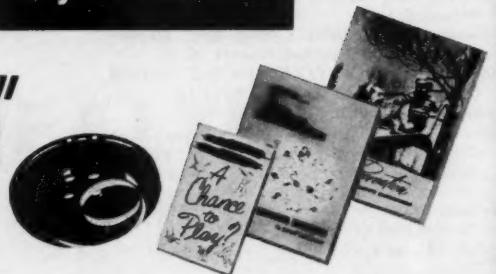
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- Kenneally, Martin M. ('48,M), Sales Mgr., Joslyn Mfg. & Supply Co., 20 N. Wacker, 6.
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- Kilstofte, Irving H. ('26,M), Eng., Commonwealth Edison Co., 72 W. Adams, 90.
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- Kincaid, H. Evert ('46,M), Partner, Kincaid & Hutchinson, 105 W. Madison, 2.
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- King, P. W. ('19,LM), Supt. of Construct., Dept. of Public Works & Bldgs., State of Ill., Box 128, Normal, Ill.
- King, Raymond B. ('40,M), Supv. Testing Bur., Automatic Elec. Co., 1033 W. Van Buren, 7.
- King, Thomas E. ('49,S), 5419 University, 15.
- Kinner, Richard, ('49,A), 1103 "B" St., Eureka, Cal.
- Kinney, Lowell K. ('48,M), Eng., Commonwealth Edison Co., 72 W. Adams, 90.
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- Kinnucan, Walter F. Jr. ('51,A), Detailer, American Bridge Co., Ambridge St., Gary, Ind.
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- Klapper, David B. ('50,A), Asst. Eng., Public Service Co. of No. Ill., 72 W. Adams, 90.
- Klecka, Joseph ('25,M), Sr. Struct. Designer, Dept. of Public Works, City of Chicago, 7.
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- Kneer, Vernon R. ('29,M), Eng., Alvord, Burdick & Howson, 1101 Ottawa, Dayton 2, Ohio.
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- Kohler, J. Richard, ('50,A), Civil Eng., Union Contract. & Engrg. Co., 30 N. LaSalle St., 2.
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- Koll, Raymond S. ('36,M), Chief Eng., Conveyor Systems, Inc., 325 S. California, 12.
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- Lorber, Seymour J. ('48,A), Res. Asst. Stanford Univ., 707 University Ave., Palo Alto, Calif.
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- McDowell, Harold L. ('43,M), Eng. of Bldgs. (state area), Ill. Bell Tel. Co., 212 W. Washington, 6.
- McDowell, Mrs. Lois ('50,A), Instructor, Ill. Inst. of Technology, 3300 S. Federal St., 16.
- McElroy, Claud E. ('48,M), Draftsman, Sr., Commonwealth Edison Co., 72 W. Adams, 90.
- McGlade, Leo ('47,M), Ch. Draftsman, Lawrence Peterson & Assoc., 601 E. Ogden, Milwaukee, Wis.
- McGovern, John P. ('50,M), Exec. Chief Eng., Union League Club, 65 W. Jackson, 4.
- McGowan, Daniel P. ('51,M), Plt. Engr., W. J. Holliday & Co., 139th & Grover, Hammond, Ind.
- McGrath, R. V. ('37,M), Eng., Chi. Bridge & Iron Co., 1305 W. 105th St., 43.
- McGuire, John B. ('50,M), Owner, T. W. Morris Trimming Mach., 6301 Winthrop, 40.
- McHugh, C. G. ('20,M), Field Eng., Ill. State Div. of Highways, Peoria, Ill.
- McJohnston, Claude A. ('48,M), Mem. Tech. Staff Bell Telephone Labs., Murray Hill, N.J.
- McKamy, Paul E. ('43,M), Sales Eng., Prater Ind. Products, 1515 S. 55th Ct., 50.
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- McMinds, Peter J. ('48,M), Exchange Plant Eng., Ill. Bell Tel. Co., 725 Chicago, Hammond, Ind.
- McMullen, Edward A. ('50,M), Struct. Eng., Western Elec. Co., Hawthorne, Sta., 23.
- McNamara, Donald M. ('49,Aff), Science Ed., Scott Foresman & Co., 433 E. Erie, 11.
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 Marx, Lester M. ('24,M), Special Asst. to Dir. of Territories, Dept. of Interior, Washington 25, D. C.
 Maslanka, Thaddeus R., ('51,M), Asst. Constr. Supt., Standard Oil Co., 20 N. Wacker Dr., 80.
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 Masters, Frank H. ('12,LM), Retired, 907 Glenwood, Joliet, Ill.
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 Mayer, Anton J. ('48,Aff), Supv. Eng., Buck Elect. Cont. Inc., 4822 Addison, 41.
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 Mayo, Robert S. ('22,M), Mayo Tunnel & Mine Equip. Co., Box 1413, Lancaster, Pa.
 Maywald, Leroy, ('48,M), Foreman, Sta. Instal., Commonwealth Edison Co., 72 W. Adams, 3.
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 Mee, Sherwood E. ('44,M), Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
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 Meissner, Robert C. ('50,M), V.P., John F. Meissner Eng., Inc., 308 W. Washington, 6.
 Melgaard, Warren H. ('49,A), Heating Eng., Central Heating Co., 1056 Lee, Des Plaines, Ill.
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 Melvin, Paul A. ('49,M), Pres., Melvin-White, Inc., 1111 Crosby, 10.
 Mento, Lawrence J. ('50,A), 8439 Drexel, 19.
 Mercier, Fernand E. ('48,M), Eng., Commonwealth Edison Co., 72 W. Adams, 90.
 Merevich, Peter ('49,M), Tele. Eng., Ill. Bell Tel. Co., 212 W. Washington, 6.
 Merrill, Mrs. Dot. ('48,M), Owner, Merrill & Co., 407 S. Dearborn, 5.
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 Michaels, Ernest E. ('23,M), V.P., Oper., Chicago Bridge & Iron Co., 1305 W. 105th, 43.
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 Mickiewicz, Stan ('48,A), Jr. Bridge Eng., City of Chi., City Hall, 2.
 Miles, Francis H., Jr., ('51,M), Gen. Mgr., Day & Zimmerman, Inc., Lone Star Ord. Div. Box 1261, Texarkana, Texas.
 Miller, Carl G. ('35,M), Asst. Dist. Mgr., Weston Elec. Instrument Corp., 205 W. Wacker, 6.
 Miller, C. Marshall ('47,M), Eng., Ill. Bell Tel. Co., 215 W. Randolph, 6.
 Miller, Charles R. ('50,M), Supt. Water & Elec. Dept., Village of Winnetka, 510 Greenbway, Winnetka, Ill.
 Miller, Donald B. ('51,M), Supv. of Gas Dist., Public Service Co. of No. Ill., 1001 S. Taylor, Oak Park, Ill.
 Miller, Donald E. ('51,A), Jr. Engr., Mississippi Valley Struct'l. Steel Co., 25th & Norwood, Melrose Park, Ill.
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 Miller, Donald W. ('46,M), 6705 Rutgers, Houston, 5.
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 Million, Rex K. ('49,A), Plant Eng., Ill. Bell Tel. Co., 725 Chicago, Hammond, Ind.
 Mills, James R., ('51,A), Foreman, U. S. Steel Co., 3426 E. 89th St., Sta. 45, 17.
 Mine, Richard Y. ('50,M), Arch. Eng., Schmidt, Garden & Erikson, 104 S. Michigan, 3.
 Mintz, N. M. ('45,M), Owner & Sales Eng., N. M. Mintz & Assoc., 7357 Cottage Grove, 19.
 Misek, Frank J. ('49,Aff), Eng. Asst., C.T.A., 79 W. Monroe, 90.
 Mitchell, A. J. ('41,M), In Service.
- Mitchell, Chester F. ('36,M), Asst. System Planning Eng., Commonwealth Edison Co., 72 W. Adams, 3.
 Mitchell, Jack ('51,S), 5122 N. Bernard St., 25.
 Mitchell, James I. ('25,M), Asst. Mgr., Power Supply, Public Service Co. of No. Ill., 72 W. Adams, 90.
 Mitchell, Jay G. ('22,M), Cons. Elec. Eng., Box 523, Evanston, Ill.
 Mitchell, Roy C. ('07,LM), Struct. Eng., Federal Housing Auth., 112 W. 9th, Los Angeles, Calif.
 Mittmann, Eugene, ('40,M), Cons. Eng., 549 W. Washington, 6.
 Mitten, George R. ('24,M), Mgr. Indus. Dev., Public Service Co. of No. Ill., 72 W. Adams, 90.
 Mitzennacher, Erwin ('48,A), Tool Des., Nat'l Supply Co., 2642 Garth Ave., Los Angeles, 34.
 Moffat, James D. ('46,M), Chief Eng., Western Reg., Penna. Ry. Co., Union Sta., 6.
 Moir, Douglas S. ('50,Aff.), Agent, New York Life Ins. Co., 134 S. LaSalle St., 90.
 MONROE, WM. S. ('01,LM, HM, Past Pres.), 105 S. LaSalle, 3.
 Monson, C. Douglas ('49,M), Field Eng., Inland Steel Co., Indiana Harbor, Ind.
 Montague, Parker J. ('50,M), Owner, Montague Construct. Co., 228 N. LaSalle, 1.
 Montblanc, E. P. ('28,M), Owner, Gen. Survey Co., 1509 W. Jackson, 7.
 Montgomery, Martin W. ('47,M), Sr. Eng., Commonwealth Edison Co., 2233 S. Throop, 8.
 Moore, Charles A. ('48,M), Proj. Eng., William A. Pope Co., 26 N. Jefferson, 6.
 Moore, Daniel E. ('48,M), Retired, 1510 W. 104th St., 43.
 Moore, Robert E. ('49,A), Field Eng., Western Elec. Co., Post Ord. Officer, Fort Custer, Mich.
 Moosbrugger, Frank J. ('35,M), Eng., Public Service Co. of No. Ill., Box 278, Glencoe, Ill.
 Morey, Albert A. ('45,M), V.P., Marsh & McLennan, Inc., 231 S. LaSalle, 4.
 Morey, Charles W. ('06,LM), Pres., Chi. Technical College, 2000 S. Michigan, 16.
 Morgan, F. M. ('41,M), Div. Eng., American Phenolic Corp., 1830 S. 54th St., Cicero, Ill.
 Morgan, George A. ('36,M), Supt. Mkt. Research Dept., Peoples Gas Light & Coke Co., 122 S. Michigan, 3.
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 Morison, James R. ('48,M), Arch., 956 E. 58th St., 37.
 Morris, John A. ('38,M), Retired, Touhy, Des Plaines, III.
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 Morrison, R. A. ('20,LM), Elec. Eng., 5454 South Shore, 15.
 Morrison, R. J. ('48,M), Supv. of Inventory Control, Public Service Co. of No. Ill., 114 N. Oak Park, Oak Park, Ill.
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 Mors, Robert J. ('49,M), Dist. Rep., Benjamin Elec. Mfg. Co., 20 N. Wacker, 6.
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 Moseley, Raymond E. ('47,M), Field Eng., Western Electric, 120 Broadway, New York, 7.
 Moses, Sam ('50,Aff), Sales Eng., Ashland Elec. Co., 752 Milwaukee, 22.
 Moss, R. S. ('06,LM), Retired, 1537 W. 47th, Los Angeles, Calif.
 Mote, Thomas H. ('40,M), Equip. Design Eng., Automatic Elec. Co., 1033 W. Van Buren, 7.
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- Murr, Milton ('20,M), Resident Eng., Eng. Corps., U.S. Army, 1234 Mich., N.E. Grand Rapids, Mich.
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- Neighbour, David J. ('48,Aff), Div. Pers. Supv., Ill. Bell Tel. Co., 6317 S. Maryland, 37.
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- Nelson, Morris O. ('28,M), V. P., J. P. Miller Artesian Well Co., 161 W. Wisconsin, Milwaukee 3, Wis.
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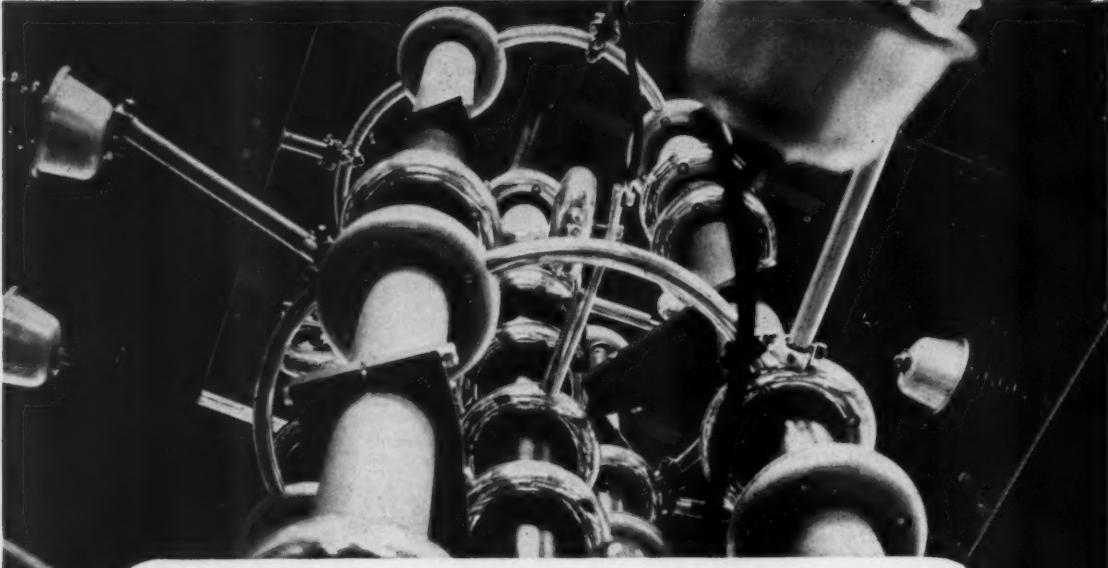
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- Radich, Joseph A. ('50,A), Mech. Eng., Chicago Proc. Office, Corps of Eng., 226 W. Jackson, 6.
- Ragan, Gerald E. ('49,A), Civil Eng., Bureau of Reclamation, 8816 S. Bishop, 20.
- Raider, George K. ('46,M), Mgr. Multi-Vent Div., The Pyle-National Co., 1334 N. Kostner, 51.
- Raisch, Charles F. ('48,M), Eng. Consultant, Stewart Warner Corp., 1826 Diversey, 14.
- Rakosnik, Frank E. ('46,M), Product Designer Hanenin Corp., 1101 S. Kilbourn, 24.
- Ramey, Horace P. ('19,LW), Asst. Chief Eng., Sanitary Dist. of Chgo., 910 S. Michigan, 5.
- Ramusack, Joseph, ('48,M), Eng., III. Bell Tel. Co., 208 W. Washington, 6.
- Randall, Edwin A. ('28,M), Acting Des. Eng., Ralph H. Burke, Inc., Bryn-Mawr & Wolf Rd.
- Randall, Frank A. Jr. ('48,M), Partner, Frank A. Randall & Sons, 205 W. Wacker, 6.
- Randolph, Robert I. ('02,LW), Retired, 1731 Santa Barbara St., Santa Barbara, Calif.
- Rasmus, Walter E. ('25,M), Eng. of Design, Dept. of Subways and Superhighways, 20 N. Wacker, 6.
- Rasmussen, Frank, ('10,LW), Consulting Eng., Link Belt Co., 300 W. Pershing, 9.
- Rasmussen, Richard J. ('31,M), Struct. Designer, Vern E. Alden Co., 120 S. LaSalle, 3.
- Ratecliff, Walter A. ('49,M), Struct. Eng., Holabird & Root & Burgee, 180 N. Wabash, 1.
- Raucher, Walter L. ('50,A), TV Tech., RCA Service Co., 7031 S. Bell, 36.
- Raymond, Ralph G. ('51,M), Gen. Sales Mgr., Commonwealth Edison Co., 72 W. Adams St., 90.
- Reace, William T. ('48,M), V.P., Commonwealth Edison Co., 72 W. Adams, 90.
- Ready, Albert P. ('50,M), Constr. Eng., A. J. Boynton & Co., 109 N. Wabash Ave., 2.
- Ream, Edward F. Jr. ('50,M), Chief Eng., Pacific Flush Tank Co., 4241 Ravenswood, 13.
- Reddison, E. W. ('28,M), Eng., Link Belt Co., 2410 W. 18th, 8.
- Reed, Kenneth E. ('49,A), Eng., Marsh & McLennan, Inc., 231 S. LaSalle, 4.
- Reel, Richard H. ('46,M), Sales Mgr., Annings Johnson Co., 1514 W. Van Buren, 7.
- Reeves, William T. ('02,LW), Retired, 1133 Johnson, Evanston, Ill.
- Rehder, John G. ('50,M), Spec. Writer, Holabird, Root & Burgee, 180 N. Wabash, 1.
- Reichard, Lester H. ('24,M), Asst. Supt. Shops & Equip., C.T.A., 4430 N. Broadway, 40.
- REICHMANN, ALBERT ('97,LW), Past Pres. Retired, 600 Central, Wilmette, Ill.
- Reifenstuhl, George E. ('49,M), Equip. Eng., Western Elec. Co., Hawthorne Station, 23.
- Reinke, John G., Jr. ('51,A), Jr. Eng., Peoples Gas Light & Coke Co., 122 S. Michigan Ave., 3.
- Reiter, Edward L. ('46,M), Sr. Asst. Subway Eng., Dept. of Subways & Superhighways, 20 N. Wacker, 6.
- Renken, Rudolf, ('43,M), Eng., R. Renken & Co., 407 S. Dearborn, 5.
- Rettaliata, J. T. ('48,M), Dean of Engrg., III. Inst. of Tech., 3300 S. Federal, 16.
- Reynolds, Edward T. ('48,M), Dist. Plant Supt., III. Bell Tel. Co., 1512 W. 63rd St., 36.
- Reynolds, I. L. ('19,LW), Asst. Dev. Contract Admin. Of, Supervising Inspector of Naval Material, 226 W. Jackson, 6.
- Rian, L. Nordlow ('46,M), Chief Struct. Eng., DeLeuw, Cather & Co., 150 N. Wacker, 1.
- Ricci, Anthony M. ('51,M), Constr. Supt., Childs & Smith, Architects, 20 N. Wacker Dr., 6.
- Rice, Chester C. ('50,M), Gas System Design, Public Service Co. of No. Ill., 1001 S. Taylor, Oak Park, Ill.
- Rice, Ralph H. ('10,LW), Retired, 406 Laurel, Wilmette, Ill.
- Ricefield, Louis ('29,M), Cons. Mech. Eng., 415 Forest Ave., Oak Park, Ill.
- Richards, N. R. ('19,LW), 1006 Western Ave., Joliet, Ill.
- Richardson, B. R. ('48,M), Elect. Supt., Western United Gas & Elec. Co., 50 Fox, Aurora, Ill.
- Richter, Harry P. ('30,M), Mgr. of Real Estate, U. S. Steel Co., 525 William Penn Pl., Pittsburgh, Pa.
- Richter, Paul O. ('44,M), Mgr., Filtration Div., The EIMCO Corp., 3319 S. Wallace, 16.
- Richter, Robert W. ('49,A), Field Eng., Intrusion Prepack, 80 E. Jackson, 4.
- Ricker, Charles W. Jr. ('49,M), Chief Spec. Eng., C.T.A., 79 W. Monroe, 90.
- Riese, Gerald E. ('49,M), Dist. Mgr., Builders Iron Foundry, 1141-43 Greenleaf, Wilmette, Ill.
- Riggen, Theodore K. ('46,M), Pres., Elmira Electronics Corp., Box 1008, Elmira, N. Y.
- Riggen, Winifred ('41,M), Eng., III. Bell Tel. Co., 212 W. Washington, 6.
- Riihimaa, Wm. A. ('48,M), Eng., U. S. Gypsum Co., 300 W. Adams, 6.
- Riley, Maynard H. ('19,LW), Retired, 1864 Sherman Ave., Evanston, Ill.
- Ringhofer, Joseph H. ('49,A), III. Bell Tel. Co., 212 W. Washington, 6.
- Ripley, Herbert S. ('19,LW), Dept. Eng., Sanitary Dist. of Chicago, 910 S. Michigan, 5.
- Ritchie, James F. ('47,M), Field Eng., DeLeuw, Cather & Co., 110 W. Main St., Stroud, Okla.
- Ritter, Albert S. ('43,M), Asst. Ch. Draftsman, Commonwealth Edison Co., 72 W. Adams, 90.
- Rivenes, A. I. ('39,M), Gen. Results Eng., III. Bell Tel. Co., 131 N. Franklin, 6.
- Rivenes, Robert A. ('50,A), In service.
- Roark, Grady L. ('51,M), Reg. Mgr., Tube Div., General Electric Co., Merchandise Mart Plaza, 54.
- Rossa, Hubert L. ('47,M), Supv. Substa., Commonwealth Edison Co., 72 W. Adams, 90.
- Roberts, John K. D. ('48,M), Traffic Eng., III. Bell Tel. Co., 212 W. Washington, 6.
- Roberts, Thomas D. ('28,M), Asst. Mgr., Urad Mine, Molybdenum Corp. of Amer., Urad Mine, Empire, Colo.
- Robertson, Alvin J. ('50,S), 5942 W. Thorndale, 30.
- Robinson, George G. ('48,M), Traffic Eng., III. Bell Tel. Co., 212 W. Washington, 6.
- Robinson, Thomas G. ('47,M), Pres., Meters & Controls, Inc., 444 N. LaSalle, 10.
- Robson, Carl D. ('30,M), Retired, 542 N. Live Oak, Glendora, Calif.
- Roche, John P. ('48,M), Chief Struct. Eng., Naess & Murphy Arch., 80 E. Jackson, 4.
- Rocke, Gilbert, ('43M), Chief Eng., Construct. Aggregate Corp., 33 N. LaSalle, 2.
- Rockwell, Matthew L. ('42,M), Partner, Stanton & Rockwell, 222 W. Adams, 6.
- Rodgers, John L. Jr. ('50,S), 4220 Alden, Minneapolis 16, Minn.
- Roe, Edward P. ('49,Aff), Loop Sales, Universal Atlas Cement Co., 208 S. LaSalle, 90.
- Rospke, Walter, ('36,M), Owner, Heinze Surveyors, 612 W. Belden, 14.
- Rogers, Donald E. ('48,A), Eng., III. Bell Tel. Co., 208 W. Washington, 6.
- Rogers, Edgar, ('29,M), Staff Eng., Public Service Co. of No. Ill., 72 W. Adams, 90.
- Rogers, Lester C. ('36,M), Bates & Rogers Construct. Corp., 600 W. Jackson, 6.
- Rogers, Paul ('42,M), Struc. Design Eng., Sargent & Lundy, 222 W. Adams, 6.
- Rohn, Edward G. ('50,A) In service.
- Rohner, Elmer J. ('49,M), Eng., III. Bell Tel. Co., 208 W. Washington, 6.
- Rohr, Werner E. ('51,A), Dev. Eng., Raytheon (Belmont Radio Div.), 5921 W. Dickens Ave., 39.
- Romanoff, J. A. ('50,M), Gen. Sales Mgr., Delta Star Elec. Co., 2437 W. Fulton, 12.
- Rommel, Richard E. ('51,A), Eng. & Draftsman, Wm. Schmidt Struct. Eng., 2838 W. Addison, 18.
- Romnes, H. I. ('50,M), Gen. Mgr., Amer. Tel. & Tel. Co., 32 Avenue of the Americas, New York, 13.
- Ronningen, Helmer A. ('40,M), Sr. Partner, Ronningen Eng. Sales, Vicksburg, Mich.
- Root, Harold L. ('49,M), Est. Ragnar Benson, Inc., 4744 W. Rice, 51.
- Root, John W. ('47,M), Arch., Holabird & Root & Burgee, 180 N. Wabash, 1.
- Rootberg, Albert ('50,M), Struct. Eng., Pure Oil Co., 35 Wacker, 1.
- Rose, Edmund G. ('35,M), Circuit Plan. Eng., Commonwealth Edison Co., 72 W. Adams, 90.
- Rose, William E. ('36,M), Landscape Arch. Eng., 33 W. 1st St., Hinsdale, Ill.
- Rosenberg, Max ('50,M), Design Eng., Mitchell Mfg. Co., 2525 N. Clybourn, 14.
- Rosenthal, Fred S. ('46,M), Elect. Eng., 1451 Winemac, 40.
- Rosing, Anton S. ('25,M), Photogrammetric Eng., U.S. Air Force, Wright Field, Area B, Dayton, Ohio.
- Rosner, Arnold S. ('50,A), Eng., Max Rosner & Assoc., 201 N. Wells, 6.
- Ross, Edward R. ('50,M), Eng. Assoc., Bruce A. Gordon Co., Engs., 1 N. LaSalle, 2.
- Ross, George B. ('46,M), Eng., III. Bell Tel. Co., 208 W. Washington, 6.

- Ross, Herman M.** ('36,M), Dist. Mgr., Graver Water Conditioning Co., 332 S. Michigan, 4.
- Ross, Wm. J.** ('47,M), Chief Eng. & Mgr., L. C. Smith Indust. Eng. Co., 2835 N. Lincoln, 13.
- Rosser, John** ('20,M), Struct. Eng., Rosser & Rosser, 173 W. Madison, 2.
- Rossi, Charles V.** ('46,M), Ind. Sales Mgr., Lukko Sales Corp., 5024 W. Irving Pk., 41.
- Rossiter, Glenn A.** ('46,M), Squad Leader, Amer. Bridge Co., Gary, Ind.
- Roszman, A. M.** ('19,LM), Head, Roszman Eng. Co., 109 N. Dearborn, 2.
- Rothberg, Simon**, ('50,M), Partner, Harry L. Dovell & Co., 332 S. Michigan, 4.
- Roth, Edward F.** ('48,M), Div. Gas Sales Mgr., Pub. Serv. Co. of No. Ill., 615 Eastern Ave., Bellwood, Ill.
- Roth, Edward N.** ('11,LM), Secy. Ace Foundry Co., 353 N. Lamon, 44.
- Rothschild, Henry** ('50,M), Elec. Eng., W-B Engineering Co., 8 S. Dearborn St., 3.
- Rothschild, Robert L.** ('50,Aff), Asst. to Pres., Consolidated Book Publishers, 153 N. Michigan, 1.
- Rowe, Lindley P.** ('50,M), Ch. of Arch'l. Dept., DeLeuw, Cather & Co., 150 N. Wacker, 6.
- Rubin, Edward C.** ('49,A), 5902 W. 26th St., Cicero 50, Ill.
- Ruchti, Graham**, ('47,M), Draftsman, Amer. Bridge Co., Gary, Ind.
- Rudd, Guy C.** ('50,M), Eng., Public Service Co. of No. Ill., 72 W. Adams St., 90.
- Ruddock, Raymond**, ('48,M), Owner, J. R. Ruddock & Assoc., 1951 Irving Pk. Rd., 13.
- Rue, Frank** ('50,M), Eng., Mississippi Valley Structural Steel Co., 25th & Norwood Aves., Melrose Park, Ill.
- Ruggles, L. L.** ('35,M), Chief Sales Eng., Automatic Elec. Sales Corp., 1033 W. Van Buren, 7.
- Ruhl, David A.** ('45,M), Div. Eng. Timber Structures, Inc., 120 S. LaSalle, 3.
- Rummel, Charles G.** ('50,M), Dept. Head, Naess & Murphy, Archt.-Engrs., 80 E. Jackson, 4.
- Rumsey, Miss Lorraine A.** ('49,A), Engr. Clerk Special, Ill. Bell Tel. Co., 208 W. Washington, 6.
- Runde, Edgar**, ('47,M), Engr., Struct. Des., Commonwealth Edison Co., 72 W. Adams, 90.
- Rupp, Earl V.** ('49,M), Mgr., Eng. Patent Depts., Bastian-Blessing Co., 4201 W. Peterson, 30.
- Rushiton, J. Henry** ('48,M), Prof. & Dir. Dept. Chem. Eng. Ill. Inst. of Tech., 33rd & State, 16.
- Rust, William K.** ('50,A), Mem. Tech. Staff, Bell Tel. Labs., 180 Varick St., New York City.
- Rutherford, Marvin H.** ('44,M), Plant Mgr., Chi. Transformer Div., Essex Wire Corp., Zanesville, Ohio.
- Ruzich, John L.** ('46,M), Div. Supt. Track, C.T.A., 1963 Racine, 14.
- Ryan, Eugene A.** ('48,M), Commonwealth Edison Co., 72 W. Adams, 90.
- Ryan, William E.** ('50,M), Eng.-Sales, Trane Co., 341 E. Ohio, 11.
- Ryder, Robert F.** ('50,M), Draftsman, Commonwealth Edison Co., 72 W. Adams, 90.
- Sadewic, Alfred R.** ('49,S), Ind. Eng. Cameron Can Machinery Co., 240 N. Ashland, 7.
- Safarik, Edgar R.** ('25,M), Chief of Insp., Leich Elec. Co., Genoa, Ill.
- Saint, George A.** ('19,LM), Retired, 289 Grace, Elmhurst, Ill.
- St. Germain, Allen E.** ('48,M), Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
- St. Pierre, Lowell C.** ('48,M), Asst. Supt. of Power Pub. Serv. Co. of No. Ill., 423 Childs St., Wheaton, Ill.
- Sale, Frank A.** ('36,M), Genl. Supv. Water Treatment Dept., Graver Tank Mfg. Co., 4809 Tod Ave., East Chicago, Ind.
- Sale, Robert R.** ('50,M), Prod. Mgr., Coe Laboratories, Inc., 6033 Wentworth, 21.
- Salle, William H.** ('40,M), Sec. Eng., Commonwealth Edison Co., 72 W. Adams, 90.
- Salzman, A. L.** ('20,M), Eng., A. L. Salzman & Sons, 134 W. Lake, 1.
- Salzman, Marshall**, ('49,M), Secy.-Treas., A. L. Salzman & Sons, 134 W. Lake, 1.
- Salzman, Max M.** ('44,M), Eng., Herman & Salzman, 53 W. Jackson, 4.
- Salzman, William B.** ('47,M), Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
- Sammons, Frank D. Jr.** ('48,A), 1752 W. Garfield, 9.
- Sampson, Alexander E.** ('44,M), Asst. Buyer, Standard Oil Co. of Ind., 910 S. Michigan, 80.
- Sandeen, Ralph A.** ('48,M), Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
- Sanden, T. E.** ('44,M), PBX Equip. Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
- Sanders, A. L. R.** ('50,M), Chief Engr., Hazelton & Erdal, 53 W. Jackson, 4.
- Sanderson, Burdett E.** ('50,M), Staff Asst., Public Service Co. of No. Ill., 72 W. Adams, 90.
- Sandham, R. D.** ('28,M), Asst. Chief Harbor Eng. Port of Long Beach, 1333 El Embarcadero, Long Beach 2, Calif.
- Sandman, Joseph J.** ('20,LM), Designer, American Bridge Co., 208 S. LaSalle, 4.
- Sandona, Bruno** ('50,A), Johnson & Johnson, 111 W. Washington, 2.
- Sanow, Nathan L.** ('40,M), Struct. Designer, Pioneer Serv. & Engng. Co., 231 S. LaSalle, 4.
- Santina, William J.** ('34,M), Sr. Hydraulic Eng. & Chief, Reports & Hydraulics Br., U. S. Engineer Office, Mdse. Mart, 54.
- Santoro, Louis L.** ('50,M), Box 314, Fox River Grove, Ill.
- Sapit, Donald T.** ('50,A), Jr. Eng., Hotpoint, Inc., 5600 W. Taylor, 44.
- Sarabia, Antonio R.** ('50,Aff), Lawyer, Baker, McKenzie & Hightower, 1 N. LaSalle, 2.
- Sarney, Richard A.** ('43,M), Retired, 926 Pueblo Solano, Rt. 2, Box 549-A, Albuquerque, N. M.
- Sass, M. E.** ('43,M), Eng. Draftsman, 1150 N. Richey, Tucson, Ariz.
- Sauerman, John A.** ('10,LM), Pres., Sauerman Bros., Inc., 522 S. Clinton, 7.
- Sauermann, Otto**, ('30,M), Struct. Eng., Armour & Co., U.S. Yards, 9.
- Saunders, N. H.** ('34,M), Engrg. Mgr., Kellogg Switchboard & Supply Co., 6650 S. Cicero, 38.
- Savukoski, Paul H.** ('50,S), 3754 N. Kildare Ave., 41.
- Sawyer, James H.** ('06,M), Asst. Bridge Eng., Cook County Highway Dept., Randolph & Wells, 6.
- Sawyer, Percy**, ('08,M), 334 Dickens, 14.
- Saxer, Harold A.** ('49,M), Estimator, A. C. Skon Co., 670 N. Carpenter, 22.
- Shaar, Harry** ('48,M), Pres. Shaar Iron Works, Inc., 1042-48 W. 11th St., 7.
- Scalamera, George W.** ('50,A), Acme Steel Co., Riverdale, Ill.
- Scanlan, Jack A.** ('18,M), Struct. Eng., 2323 Pioneer, Evanston, Ill.
- Scapin, John F.** ('50,A), Civil Eng., Ill. Div. Highways, 160 N. LaSalle, 1.
- Schad, James A.** ('41,M), Eng., Amer. Iron & Steel Inst., 350 5th Ave., New York 1, N.Y.
- Schaefer, James W.** ('27,M), Supv. Field Struct. Eng., Commonwealth Edison Co., 72 W. Adams, 90.
- Schafmayer, A. J.** ('07,LM), Asst. Chief Eng. of Sewers, City of Chi., City Hall, 2.
- Schaibly, Harold M.** ('41,M), Head Start. Eng., Commonwealth Edison Co., 2233 S. Throop, 8.

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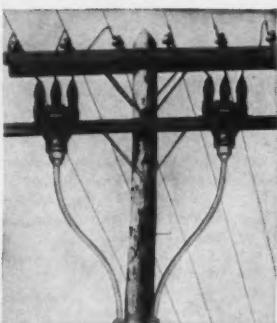
Telephone: NEvada 2-4200

- Schaller, W. F. ('23,M), 132 N. Brainard, LaGrange, Ill.
 Schar, Clarence F. ('49,Aff), Supt. Fire Prev. Safety, Univ. of Ill., 721 S. Wood, 12.
 Schaub, J. Benton, ('13,LM), Asst. Eng. of Bldgs., I.C. Ry., 135 E. 11th Pl., 5.
 Scheer, Alfred ('50,M), Chief Elec. Eng., Shaw, Metz & Dolio, 208 S. LaSalle, 4.
 Scheerens, Joseph J. ('48,M), Arch. Rep., Amer. Struct. Products Co., 221 N. LaSalle, 1.
 Scheineman, Fred W. ('23,M), Asst. Chief Eng., Mfg. Dept., Standard Oil Co., 910 S. Michigan, 5.
 Scholler, Wm. A. ('50,S), 1823 Hinman, Evanston, Ill.
 Schwabe, Louis C. ('45,M), Eng., Ill. Bell Tel. Co., 212 W. Washington, 6.
 Schick, Jack M. ('49,S), 10424 S. Calumet, 28.
 Schick, Norman H. ('49,Aff), Supv. Repro. Dept., Frederick Post Co., 333 W. Lake, 6.
 Schiffer, Joseph A. ('47,M), Supv., Commonwealth Edison Co., 2233 S. Throop, 8.
 Schilling, Henry ('27,M), Power Plant Eng., Genl. Aniline & Film Corp., Riverside, Rensselaer, N.Y.
 Schindler, James C. ('51,A), Chief Draftsman, Leitner Equipment Co., 2326 S. Canal St., 16.
 Schipper, Richard C. ('48,M), Tech. Rep., Insur. Co. of No. Amer., 231 S. LaSalle, 4.
 Schirmer, Chester W. ('50,A), In service.
 Schirmer, R. W. ('46,M), Pres., Hendricks Eng. Corp., 6544 N. Sheridan, 26.
 Schlax, Wm. F. ('37,M), Chief Eng., Industrial Equip. Co., 315 N. Ada, 7.
 Schleicher, George P. ('49,A), Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
 Schlesinger, Lee ('49,A), Soils Eng., Soil Testing Services, Inc., 4520 W. North Ave., 39.
 Schlesinger, Max, ('28,M), Design Eng., Heyl & Patterson, Inc., 55 Water, Pittsburgh, Penna.
 Schless, J. T. ('20,LM), Pres., Schless Construct. Co., Inc., 709 Rogers, Downers Grove, Ill.
 Schlinz, Herman W. ('34,M), Vern E. Alden Co., 120 S. LaSalle, 3.
 Schmaus, Richard H. ('48,A), In service, 3512 N. Damen, 18.
 Schmidt, Casper N. ('48,Aff), Asst. Factory Mgr., Ahlberg Bearing Co., 3025 W. 47th St., 32.
 Schmidt, E. A. ('50,M), Dist. Mgr., I-T-E Circuit Breaker Co., 105 W. Adams St., 3.
 Schmidt, E. F. Jr. ('41,M), Power Std's Eng., Western Elec. Co., Hawthorne Sta., 23.
 Schmidt, Edward W. ('50,M), Std's. Eng., Link-Belt Co., 301 W. Pershing, 9.
 Schmidt, Herbert C. ('50,M), Partner, Harry L. Dovell & Co., 332 S. Michigan, 4.
 Schmidt, Herbert J. Jr. ('50,A), 4025 Warwick, 41.
 Schmidt, Paul O. ('48,M), Owner, North Evanston Camera Shop, 1814 Central, Evanston, Ill.
 Schmidt, Ralph G. ('48,M), Asst. Eng., Commonwealth Edison Co., 72 W. Adams, 90.
 Schmidtke, Richard A. ('51,A), Instructor, Ill. Inst. of Technology, 3300 S. Federal St., 16.
 Schmitz, Carl E. ('45,M), V.P. Crane Packing Co., 1800 Cuylar, 13.
 Schnadt, Arthur H. ('46,M), Plant Eng., Ill. Bell Tel. Co., 6317 Maryland, 37.
 Schneider, Philip W. ('48,M), Asst. Dist. Eng., Johns-Manville Sales Corp., Mdse. Mart Plaza, 54.
 Schneller, Robert J. ('50,A), Material Handling Eng., Western Elec. Co., Inc., 22nd & Cicero, Cicero, 50, Ill.
 Schnetzler, Edward G. ('48,M), Div. Staff Supv., Ill. Bell Tel. Co., 5643 N. Broadway, 40.
 Schofield, W. C. ('23,M), Chief Eng., Frey Engng. Co., 109 N. Wabash, 2.
 Schoonover, Howard D. ('48,M), Eng., Ill. Bell Tel. Co., 212 W. Washington, 6.
 Schorlemmer, Harold J. ('49,M), Eng. Bldg., Ill. Bell Tel. Co., 208 W. Washington, 6.
 Schorsch, Vincent A. ('51,M), Field Eng., Public Service Co. of No. Ill., 1701 S. First Ave., Maywood, Ill.
 Schrader, Herbert E. ('36,M), Eng., Link-Belt Co., 2410 W. 18th, 8.
 Schreiner, John E. ('34,M), Supt., Great Lakes Dredge & Dock Co., Box 24, Marine City, Mich.
 Schroeder, Bernard A. ('33,M), Partner, Schroeder, Merriam, Hofgren & Brady, 20 N. Wacker, 6.
 Schroeder, Bernhard ('09,LM), Retired, Rte. 1, Box 99-X, Mt. Dora, Fla.
 Schroeder, Henry C. ('38,M), Partner, Sargent & Lundy, 140 S. Dearborn, 3.
 Schrotberger, Clyde H. ('49,M), Div. V.P. Rep., Public Service Co. of No. Ill., 159th & Fisk, Harvey, Ill.
 Schuber, Joseph L. ('48,M), Supt. of Substa., Commonwealth Edison Co., 72 W. Adams, 90.
 Schubert, Arthur J. ('48,A), Sales Eng., Harry W. Gebhard, 5129 W. Devon, 30.
 Schuler, Charles R. ('49,M), Sec. Eng., Commonwealth Edison Co., 72 W. Adams, 90.
 Schuler, Reginald G. ('36,M), Inventor, Victor Adding Mach. Co., 3900 N. Rockwell, 18.
 Schultz, Roy M. ('43,M), Eng., D. A. Freeman Corp., 621 S. Kolmar, 24.
 Schulze, Franz, ('44,M), Cons. Eng., Industrial Designing Eng. Assoc., 53 W. Jackson, 4.
 SCHUMACHER, L. J. ('51,A), Elec. Squad Leader, Frey Engng. Co., 109 N. Wabash, 2.
 Schuster, J. V. ('50,M), Supv. Eng., Commonwealth Edison Co., 2233 S. Throop, 8.
 Schutte, Leo H. ('47,M), Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
 Schwalm, Harold E. ('48,M), Supt. Gas Supply, Public Service Co. of No. Ill., 1001 S. Taylor, Oak Park, Ill.
 Schweitzer, Arthur R. ('32,M), Retired, Box 653, Lake Forest, Ill.
 Schweitzer, William E. ('45,M), Pres., W. M. E. Schweitzer & Co., 2207 Dodge, Evanston, Ill.
 Schwendeman, Richard, ('49,M), V.P., Krahle Cons. Co., 350 N. Clark, 10.
 Scitine, Andrew P. ('51,S), 116 N. 21st Ave., Melrose Park, Ill.
 Scopelite, John J. ('49,A), Draftsman, Carnegie-Ill. Steel Co., 9323 S. Ridgeland, 17.
 Scott, John V. ('50,A), Asst. Eng., Commonwealth Edison Co., 72 W. Adams, 90.
 Scott, Robert G. ('37,M), Chief Eng., Clay Prod. Assoc., 100 N. LaSalle, 2.
 Scott, W. H. ('51,M), Exec. Asst. Mgr. of Purchases, Standard Oil Co., 910 S. Michigan Ave., 80.
 Scott, W. Kenneth ('44,A), Mech. Eng., Nat'l Advisory Comm. for Aeronautics, Langley Field, Hampton, Va.
 Seaholm, Rudolph V. ('51,M), Chief Draftsman, Contract Div., John Mohr & Sons, 3200 E. 96th St., 17.
 Seaman, Richard P. ('48,M), Elec. Eng., Commonwealth Edison Co., 72 W. Adams, 90.
 Seaman, Benjamin E., ('43,M), Pres., Westland Engng. Supply Co., 53 W. Jackson, 4.
 Seaton, G. Leland ('28,M), Gen'l Mgr., Chi., Ill. Bell Tel. Co., 212 W. Washington, 6.
 Sebastian, John P. ('49,Aff), Eng. Dept., Fireman's Fund Insur. Co., 175 W. Jackson, 4.
 Sedgwick, Frederick W. ('40,Aff), Supv. Eng., Nat'l. Inst. of Tech., 515 Fourth St., N.W., Washington, D. C.
 SEDWICK, H. P. ('23,M, Past Pres.), Exec. V.P., Public Service Co. of No. Ill., 72 W. Adams, 90.
 Seeley, Ray, ('12,LM), Civil Eng., 12 Elizabeth, Hammond, Ind.
 Seibert, Donald K. ('50,S), 6645 N. Keating, Lincolnwood 30, Ill.
 Seibert, William J. ('45,M), Dist. Plt. Supt., Ill. Bell Tel. Co., 901 Main St., Peoria 2, Ill.
 Seidensticker, F. W. ('20,M), Struct. Eng., Childs & Smith, Arch., 20 N. Wacker, 6.
 Selander, Karl W. ('40,M), Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
 Sellergren, Albert J. ('51,A), Eng., Ill. Bell Tel. Co., 212 W. Washington, 6.
 Semaitis, Albert, ('44,A), Sr. Draftsman, Clearing Machine Corp., 6499 W. 65th St., 38.
 Sener, Charles J. ('48,A), Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
 Sener, Fred P. ('50,A), In service.
 Sepulveda, Luis A. ('42,M), Mech. Engr., Sargent & Lundy, Engineers, 140 S. Dearborn, 3, and Mech. Res. Engr., Armour Research Foundation, Ill. Inst. Technology Center, 16.
 Serat, George Wm. ('32,M), Eng., Amer. Bridge Co., 208 S. LaSalle, 4.
 Seskowski, Albert R. ('49,A), Mfg. Supv. Trainer, Continental Can Co., 174 Chestnut, Mankato, Minn.
 Seth, George W. ('28,M), Struct. Eng., Holabird Root & Burgee, 180 N. Wabash, 1.
 Severns, Clifford P. ('49,M), Contract Mgr., Naess & Murphy, 80 E. Jackson, 4.
 Severson, Norman, ('38,M), Highway Eng., Ill. Div. of Highways, 700 E. Norris, Ottawa, Ill.
 Seymour, Chas. W. ('36,M), Asst. Dir.—M.P.A., U. S. Government, 4420—18th St., North, Arlington, Va.
 Shapiro, Benj. B. ('17,M), Cons. Eng., 100 W. Monroe, 3.
 Sharring, Fred A. ('49,M), Spec. Writer, A. J. Boynerton & Co., 109 N. Wabash, 2.
 Shaver, A. G. ('20,LM), Cons. Eng., 434 N. Hazel Danville, Ill.
 Shaw, Howard D. ('26,M), Mgr., Ida B. Wells Homes, Chi. Housing Auth., 454 E. Pershing, 15.
 Shaw, Walter C., ('51,M), Engr. (Tel. Equip. Real Estate) Ill. Bell Tel. Co., 208 W. Washington St., 6.
 Shea, Murt A. ('51,A), Tel. Eng., U. S. Navy, Dist. Public Works, NTC Bldg., 1-A, Great Lakes, Ill.
 Sheehan, Edward D. ('47,M), Mgr. Gas Oper. Public Service Co. of No. Ill., 72 W. Adams, 90.
 Shelley, Glenn S. ('50-S), Kappa Sigma House, Northwestern Univ., Evanston, Ill.
 Shelton, George E. ('49,M), Construc. Eng., Universal Oil Products Co., 310 S. Michigan, 4.
 Sherman, LeRoy K. ('95,LM), 1143 Clarence Ave Oak Park, Ill.
 Sherman, Thomas N. ('30,M), Bldg. Eng., Public Service Co. of No. Ill., 1701 1st, Maywood, Ill.
 Sherman, Thomas R. ('49,M), Draftsman-Checker, Vern E. Alden Co., 120 S. LaSalle, 1.
 Shevisak, Maj. Frank G. ('38,M), Asst. Prof., Pa. State College, 2462 ASU, ROTC, State College, Pa.
 Shewski, Walter ('51,A), Asst. Eng., Public Service Co. of No. Ill., 72 W. Adams St., 90.
 Shoemaker, Robert M. ('51,A), Analyst, Crane Co., 4100 S. Kedzie Ave., 32.
 Shoresman, Allen M. ('51,M), President, The Starne Co., Inc., 14 E. Jackson Blvd., 4.
 Shortess, E. S. Jr. ('41,A), Chief Eng., Burlington Inst. Co., 214 N. 4th, Burlington, Ia.
 Shuman, A. B. ('36,M), Com. Eng., Ill. Bell Tel. Co., 230 W. Washington, 6.
 Shuman, E. C. ('27,M), Dir. of Research, Kaylo Div., Owens-Ill. Glass Co., Box 1035-36, Toledo 1, Ohio.
 Shumway, Noble C. Jr. ('41,M), Chief, Antenna Survey Branch, F.C.C., New P.O. Bldg., Washington 25, D. C.
 Siebentritt, Harold F. ('51,M), Owner, Siebentritt Construction, 700 E. 92nd Pl., 17.
 Sielski, Matthew C. ('47,M), Dir. Safety & Traf. Eng., Chi. Motor Club, 66 E. So. Water, 1.
 Siewert, Daniel R. ('42,M), Dist. Supt. Service Shop, General Elec. Co., 849 S. Clinton, 80.
 Siewerth, Arthur E. ('48,Aff), Pres., Arthur G. Siewerth Sons, 6445 N. Artesian, 45.
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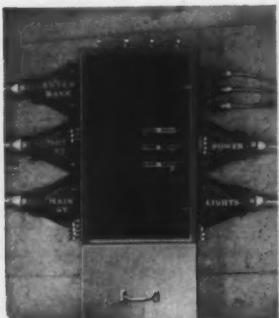
tionalizing cables; for disconnecting branches from through runs and for isolating transformers. Single phase branch loads can be balanced on a three phase main by shifting the interchangeable plug caps. The gang operating feature has increased their usefulness as a three phase cable end disconnect.

CABLE BOXES

Disconnect link subway cable boxes were an early development for sectionalizing underground cables in the same way that pole top disconnects are used on overhead systems. There are two general classes of high voltage link boxes—AIR FILLED for voltages up to 7500 and OIL FILLED for higher voltages. Time is required to operate the links in subway cable boxes



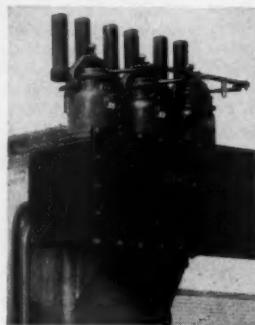
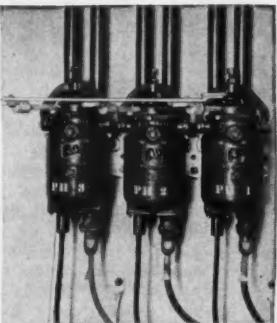
because the circuits must be de-energized, the gasketed cover removed, the links individually removed or inserted and the cover replaced. Boxes should be tested for air and water tightness after each time they have been opened. The use of cable boxes may be justified by economic considerations when the frequency and the time required for operation of links is not an important factor.



Send for your copy of new bulletin No. H49, a treatise on "Primary Cable System Flexibility."

OIL FUSE CUTOUTS

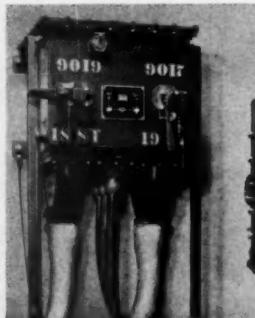
G&W Type "FC" oil fuse cutouts are used for fusing and switching of primary circuits in subway, vault and overhead installations. The gang operating mechanism provides for load break three phase sectionalizing. The fuse gives overload and short circuit protection. Within the limits of their short circuit interrupting capacity, oil fuse cutouts often



can be applied to locations which do not require the more expensive oil circuit breakers. The heavy all steel housing confines the fuse arc, providing safety from fire. The sealed construction is submersion proof. Cutouts are used as separate units for single conductor cables or mounted on welded steel boxes which enclose connections to multiple conductor cables.

OIL SWITCHES

For safe, speedy sectionalization of cable circuits install load break subway oil switches. In case of trouble, sections of cable can be quickly isolated and circuits can be rerouted to restore service in the area affected. Load break disconnection is accomplished by manual (or automatic) operation of an external lever—without opening the tank or breaking the seal. Separate



unit single throw oil switches are preferred by some operators. On the other hand, G&W Type "RA" multiple circuit oil switches combining standardized unit parts are solving many sectionalizing problems. Their simple sturdy design requires minimum maintenance. There is a definite trend toward their use because they save space and provide system flexibility in a simple and economical manner.

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- Silla, Mario R. ('42,A), Struct. Eng., Standard Oil Co. (Ind.), 910 S. Michigan, 12.
- Silcox, L. K. ('21,LM), Exec. V.P., N.Y. Air Brake Co., Starbuck Ave., Watertown, N.Y.
- Simans, Irwin W. ('47,Aff), Electron. Eng., Civil Aeronautics Adm., O'Hare Field, Park Ridge, Ill.
- Simon, Louis I. ('41,M), Arch. Eng., 179 W. Washington, 2.
- Simons, Howard A. ('39,M), Cons. Eng., 16 E. Hastings, Vancouver, B.C. Canada.
- Simons, Paul B. ('49,M), Sales Rep., Bell Lumber & Pole Co., 1545 E. 60th St., 37.
- Simpson, Arthur R. ('42,M), Contract. Eng., Chi. Bridge & Iron Co., 322 S. Michigan, 4.
- Simpson, Earl B. ('24,M), Retired, 4805 Crestland Rd., LaMesa, Calif.
- Simpson, George N. ('20,M), 37 W. Van Buren, 5.
- Simpson, J. R. ('35,M), Elec. Eng., Norman F. Bueker, Engrg. Cons., 37 S. Wabash, 3.
- Simpson, Ralph H. ('20,LM), Pres. & Treas., Ralph H. Simpson Co., 1680 N. Ada, 22.
- Sipp, Thurman L. ('47,M), Elec. Eng., C. P. Clare & Co., 4719 W. Sunnyside, 30.
- Siska, Charles J. Jr. ('49,M), Eng.-Draftsman, DeLeuw, Cather Co., 150 N. Wacker, 6.
- Skelton, Joseph H. ('49,M), Mech. Eng. Partner Vern E. Alden Co., 120 S. LaSalle, 3.
- Skene, William T. ('49,A), Struct. Eng., N. Amer. Aviation-Aerophysics Lab., 12214 Lakewood, Downey, Calif.
- Skillman, John E. ('45,M), Eng. & Supt., Maxon Construct. Co., Inc., 131 N. Ludlow, Dayton, 2.
- Skinner, Durward D. ('49,M), Local Mgr., Otis Elevator Co., 6008 Stony Island, 37.
- Skinner, Sylvan J. ('46,M), Eng., Dept. of Interior, Bur. of Reclamation, Denver Fed'l Center, Denver, Colo.
- SKOG, LUDWIG. ('26,M, Trustee), Sr. Partner, Sargent & Lundy, 140 S. Dearborn, 3.
- Skillingstad, Dale E. ('47,M), Dist. Eng., Kerite Co., 122 S. Michigan, 3.
- Slack, McCreary J. ('51,S), 3038 W. Addison St., 18.
- Slack, William E. ('48,A), Sales Eng., Anglo Corp., 4234 N. Lincoln, 18.
- Sladek, Norbert J. ('50,A), In Service.
- Slate, Arthur, R. Sr. ('50,M), Spec. Eng., Gasway Corp., 6463 N. Ravenswood, 16.
- Slezak, John, ('27,M), Pres., Turner Brass Wks., Sycamore, III.
- Sloan, W. G. ('99,LM), Cons. Eng., Provinceline Rd., Princeton, N.J.
- Slocum, Harold H. ('48,M), Eng., Commonwealth Edison Co., 72 W. Adams, 90.
- Slygh, Edward J. ('30,M), Eng., Campbell-Lowrie Lautermilch Corp., 400 W. Madison, 6.
- Smeltzer, Lloyd R. ('51,A), Sales Eng., Otis Elevator Co., 600 W. Jackson, 6.
- Snobey, Rudolph P. ('47,M), Supv. Eng., Commonwealth Edison Co., 72 W. Adams, 90.
- Smedley, Glenn B. ('48,M), Sr. Eng., Commonwealth Edison Co., 72 W. Adams, 90.
- Smitters, S. T. ('09,LM), Asst. C. Eng., Sanitary Dist. of Chi., 910 S. Michigan, 5.
- Smith, Arthur B. ('20,LM), V.P., Automatic Elec. Labs., Inc., 1033 W. Van Buren, 7.
- Smith, C. G. ('44,M), Asst. Div. Traf. Eng., Western Union Tel. Co., 427 S. LaSalle, 5.
- Smith, Dwight L. ('27,M), Gen'l Mgr., C.N.S. & M. Ry., Highwood, Ill.
- Smith, Earl J. ('43,M), Retired, 208 Woodbine, Wilmette, Ill.
- Smith, Edward R. ('47,M), Staff Asst., Commonwealth Edison Co., 72 W. Adams, 90.
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- Smith, Frank V. ('49,M), Chief Elec. Eng., Sargent & Lundy, 140 S. Dearborn, 3.
- Smith, Fred B. ('49,M), Branch Mgr., Montgomery Elevator Co., 329 S. Wood, 12.
- Smith, Frederick C. ('47,M), Fire Prot. Eng., Marsh & McLennan, Inc., 231 S. LaSalle, 4.
- Smith, Gilbert M. ('42,M), 215 N. West St., Wheaton, Ill.
- Smith, H. Kellogg ('51,M), Cons. Engr., 53 W. Jackson Blvd., 4.
- Smith, Harold E. ('40,M), Dist. Plan. Eng., Commonwealth Edison Co., 72 W. Adams, Chi., 90.
- Smith, John R. ('45,M), 8 S. Dearborn, 3.
- Smith, Kilburn M. ('28,M), Syst. Plan. Eng., Commonwealth Edison Co., 72 W. Adams, 90.
- Smith, Louis A. ('49,M), Maint. Supv., Ill. Bell Tel. Co., 6317 S. Maryland, 37.
- Smith, Marius W. ('49,Aff), Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
- Smith, Monroe A. ('29,M), Acoust. Eng., U.S. Gypsum Co., 300 W. Adams, 6.
- Smith, O. G. ('35,M), Chief Eng., Ill. Bell Tel. Co., 212 W. Washington, 6.
- Smith, Osborne B. ('47,M), Owner, Osborne B. Smith & Co., 1957 E. 71st St., 49.
- Smith, Paul R. ('50,S), 1421 N. Latrobe, 51.
- Smith, R. C. ('99,LM), Retired, Mile 5 at 9 one-quarter, Weslaco, Tex.
- Smith, Reynolds E. ('50,M), Div. Eng., Public Service Co. of No. Ill., 22 W. Cass, Joliet, Ill.
- Smith, Walter E. ('46,M), Chief Eng., Central Steel & Wire Co., 300 W. 51st St., 29.
- Smith, William R. ('49,A), Engrg. Trainee, Internat'l Business Mach., 1601 North, Annex 3, Endicott, N.Y.
- Smythe, Edwin H. ('07,LM), Monadnock Bldg., 4.
- Snapp, Karl M. ('46,M), Squad Leader, Amer. Bridge Co., Gary, Ind.
- Snoek, Wilbur L. ('26,M) Supt. Gas Prod., Public Service Co. of No. Ill., 615 Eastern Ave., Bellwood, Ill.
- Snow, Frank W. ('28,M), Sales Eng., Otis Elevator Co., 600 W. Jackson, 6.
- Snyder, Harry W. ('50,M), Dist. Plant Eng., Ill. Bell Tel. Co., 131 N. Franklin, 6.
- Snyder, Howard ('50,S), 2609 E. Jackson Blvd., Elkhart, Ind.
- Snyder, Robert A. ('48,M), Factory Eng., Western Elec. Co., Inc., Hawthorne Sta., 23.
- Soderholm, A. C. ('30,M), Mech. Eng., Vern E. Alden Co., 120 S. LaSalle, 3.
- Sokolowski, John J. ('44,A), Automat. Tool Designer, Dole Valve Co., 1901 W. Carroll, 12.
- Solheim, Peter J. M. ('35,M), Struct. Eng., City of Chi., Dept. of Subways, 20 N. Wacker, 6.
- Sommerfield, Summer S. ('37,M), Mech. Eng., 1913 E. Indiana, Wheaton, Ill.
- Somerschild, Harold F. ('49,M), Struct. Eng., Portland Cement Assoc., 4617 N. Keating, 30.
- Sonderegger, H. H. ('28,M), Link-Belt Co., 300 W. Pershing, 9.
- Sonne, Fred T. ('50,M), V.P.-Sec., Chicago Aerial Survey Co., 332 S. Michigan, 4.
- Soper, Taylor G. ('45,Aff), Exec. Secy., Ill. Road Bdls. Assoc., 228 N. LaSalle, 1.
- Sorber, Gilbert ('38,M), Staff Eng., Automatic Elec. Sales Corp., 1033 W. Van Buren, 7.
- Sothen, William H. ('47,M), Staff & Personnel Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
- Sowa, Constantine P. ('51,A), Electronic Field Engr., RCA Service Co., 636 AC&W Sq., Portland Air Base, Oregon.
- Soyer, Homer R. ('49,A), C. Eng., Robert R. Anderson Co., 4550 W. Patterson, 41.
- Spake, Lloyd C. ('49,M), Sales, Allis Chalmers Mfg. Co., 135 S. LaSalle, 3.
- Spalding, Frank W. Jr. ('46,M), Asst. Secy., Springfield Fire & Marine Insur. Co., 222 W. Adams, 6.
- Spaulding, Robert E. ('45,M), Arch-Eng., Amer. Can Co., 104 S. Michigan, 3.
- Spence, James C. Jr. ('49,A), Jr. Eng., Peoples Gas Light & Coke Co., 122 S. Michigan, 3.
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- Spencer, Henry C. ('48,M), Dir. Tech. Drwg. Dept., Ill. Inst. of Tech., 3300 Federal, 16.
- Spencer, William J. ('50,M), Plant Supv., Ill. Bell Tel. Co., 20 N. Wacker, 6.
- Spiegel, Milton, ('29,M), V. P. & Gen'l Mgr., Chi. Pump Co., 2300 Wolfram, 18.
- Spillet, William D. ('43,M), Eng., Robins Inc., 402 W. Randolph, 6.
- Spitzer, Harry J. Jr. ('50,A), Instr. Man., N.Y.C. Ry., LaSalle St. Station.
- Spooner, Albert M. ('51,M), Resident Engr., City of Chgo., Bureau of Streets-Electricity, City Hall, 2.
- Springer, Geo. B. ('90,LM), Retired, Northern Trust Co., 50 S. LaSalle, 3.
- Sprout, Malcolm R. ('40,M), Equip. Eng., Ill. Bell Tel. Co., 212 W. Washington, 6.
- Spurling, L. M. ('26,M), Staff & Personnel Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
- Stacy, D. F. ('38,M), Plan. Eng., Ill. Bell Tel. Co., 212 W. Washington, 6.
- Stacy, George P. ('50,A), Sales Eng., Allied Concrete Supply Co., 3727 S. Maplewood, 32.
- Staff, Virden E. ('49,M), Staff Eng., DeLeuw, Cather & Co., 150 N. Wacker, 6.
- Staley, E. G. ('36,M), Mgr. Chi. Office, Henry Vogt Machine Co., 111 W. Monroe, 3.
- Stamis, Constantine ('51,A), Struct. Engr., Holabird & Root & Burgee, 180 N. Wabash, 1.
- Stanberry, J. N. ('41,M), V. P., Ill. Bell Tel. Co., 212 W. Washington, 6.
- Stang, Lester R. ('48,M), Gen'l Com. Eng., State Area, Ill. Bell Tel. Co., 208 W. Washington, 6.
- Stange, Raymond P. ('48,S), Engrg. Draftsman, Cook County Highway Dept., 130 N. Wells, 6.
- Stankiewicz, Eugene, ('50,M), Chief Struct. Eng., Sargent & Lundy, 140 S. Dearborn, 3.
- Stanley, Alfred H. ('47,M), Wks. Mgr., Joslyn Mfg. & Supply Co., 3700 S. Morgan, 9.
- Stanley, Eugene R. ('49,A), Employee & Community Relations, Gen'l Elec. Co., Syracuse, N.Y.
- Stanley, LaRoy S. ('51,M), Contract Mgr., John Mohr & Sons, 3200 E. 96th St., 17.
- Stanton, Kenneth J. ('29,M), Gas Dev. Eng., Public Service Co. of No. Ill., 615 Eastern Ave., Bellwood, Ill.
- Starbuck, Francis A. ('46,M), Equip. Eng., Ill. Bell Tel. Co., 212 W. Washington, 6.
- Stark, Frank M. ('48,M), Maint. Supv., Western Union Tel. Co., 1029 W. Adams, 7.
- Starkovich, John F. ('48,M), Chief Elec. Eng., Janette Mfg. Co., 556 W. Monroe, 6.
- Starrett, John E. ('49,M), Partner, Perkins & Will, 309 W. Jackson, 6.
- Staschke, Ralph A. ('50,A), In service.
- Stauss, Raymond O. ('45,M), Dist. Supt. Gas Constr., Public Service Co. of No. Ill., James & Ann Streets, Blue Island, Ill.
- Stedman, Elmore W. ('20,LM), Retired, 100 Arthur, Park Ridge, Ill.
- Steele, Hoyt P. ('49,M), Exec. V. P., Benjamin Elec. Mfg. Co., Des Plaines, Ill.
- Stein, Harry L. ('27,M), Supt., Sunnen Prod. Co., 7910 Manchester, St. Louis, Mo.
- Steffa, Homer I. ('19,LM), Fox Lake, Wis.
- Stein, J. Stewart ('49,M), Partner, Sobel & Stein, 450 E. Ohio, 11.
- Steinweg, Carl H. ('46,M), C. Eng., Cook County Highway Dept., 130 N. Wells, 17.
- Steitz, Carl G. ('48,M), In service.
- Steitz, Gustave J. ('48,M), Chief Estimat., Henry Ericsson Co., 228 N. LaSalle, 1.
- Stelter, Wm. L. ('43,A), Chief Eng., Synchro-Start Prod. Inc., 851 N. Ridgeway Ave., Skokie, Ill.
- Stepka, Raymond C. ('49,Aff), Draftsman, Public Service Co. of No. Ill., 72 W. Adams, 90.
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- Stevens, Charles J.** ('47,M), Equip. Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
- Stewart, Charles E.** ('45,M), Cons. Eng., 7658 Calumet, 19.
- Stewart, James A.** ('40,M), Asst. Dist. Supt., Ill. Bell Tel. Co., 714 W. Lake St., Oak Park, Ill.
- Stewart, Robert J.** ('48,M), Eng., Ill. Bell Tel. Co., 208 W. Washington, 6.
- Stewart, William H. Jr.** ('51,S), Sales Engr., Graver Tank & Mfg. Co., 4809 Todd St., East Chicago, Ind.
- Stickney, G. W.** ('16,LM), Retired, 215 S. Washington, Wheaton, Ill.
- Stiefel, Paul** ('50,A), Jr. Engr., Glenn L. Martin Co., Baltimore 17, Md.
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- Stoler, Samuel B.** ('46,M), Pres. Hecker & Co., Inc., 59 W. Marquette, 21.
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- Stoneburner, H. L. Jr.** ('50,M), V. P., John Griffiths & Son Construct. Co., 228 N. LaSalle, 1.
- Storer, Edwin W.** ('50,A), In service.
- Storey, Donald G.** ('36,M), R.R. 1, Bensenville, Ill.
- Stott, Louis H.** ('49,M), Asst. to Chief Eng., Robert W. Hunt Co., 175 W. Jackson, 4.
- Stoyanov, Alex** ('29,M), Owner, Alex Stoyanov Engrs., 833 N. Shaver, Portland, 12 Ore.
- Strassen, R. B.** ('28,M), Elec. Eng., Fries-Walters Co., 2001 W. Pershing, 9.
- Strasser, R. J.** ('28,M), Partner, Sargent & Lundy, 140 S. Dearborn, 3.
- Strate, T. H.** ('20,LM), Retired, 6753 N. Sioux, 30.
- Strazz, Anthony J.** ('36,M), Struc. Designer, Pure Oil Co., 35 E. Wacker, 1.
- Streicher, Albert H.** ('49,A), Chief Inspec., Industrial Spring Co., 1632 N. Wells, 14.
- Streicher, Irving H.** ('47,M), Plant Supt., Grand Sheet Metal Products Co., 2501 W. 24th St., 8.
- Stretch, Richard J.** ('36,M), Pres., Monroe Elec. Co., 157 W. Ontario, 10.
- Strickland, W. P. Jr.** ('46,M), Chief Mech. Eng., Simpson Optical Mfg. Co., 3200 W. Carroll, 24.
- Strid, Oscar W.** ('36, M), Proj. Eng., Foote Bros. Gear & Machine Corp., 4545 S. Western, 9.
- Strieff, David T.** ('51,M), Supv. Oper. Engr., Public Service Co. of No. Ill., 918 University Pl., Evanston, Ill.
- Striepling, John A.** ('51,S), 2751 W. Logan Blvd., 47.
- Strobeck, Roy A.** ('43,M), Mgr. Real Estate, Commonwealth Edison Co., 72 W. Adams, 90.
- Strom, Donald E.** ('51,A), Elec. Engr., U. S. Steel Co., 3426 E. 89th St., Mail Sta. 10.
- Stromberg, John A.** ('14,LM), Struc. Eng., 8 S. Dearborn, 3.
- Stroup, Charles L.** ('45,M), Chief Eng., Hubbard & Co., 5401 Roosevelt, 50.
- Strutz, C. R.** ('49,M), Mgr., Mech. Dept., Oxweld Ry. Service Co., 230 N. Michigan, 1.
- Stuhlfauth, George** ('45,M), Sec. Chief Mach Design, Western Elec. Co., Cermak & Cicero, 23.
- Stump, Robin D.** ('46,M), Div. Staff Supv., Ill. Bell Tel. Co., 65 W. 113th Pl., 38.
- Suchomel, Harold J.** ('51,S), 2235 12th Ave., North Riverside, Ill.
- Sues, Roy L.** ('43,M), Chief Eng., Spra-Con Co., 3600 N. Elston, 18.
- Sukka, John L.** ('36,M), Eng., Commonwealth Edison Co., 140 S. Dearborn, 90.
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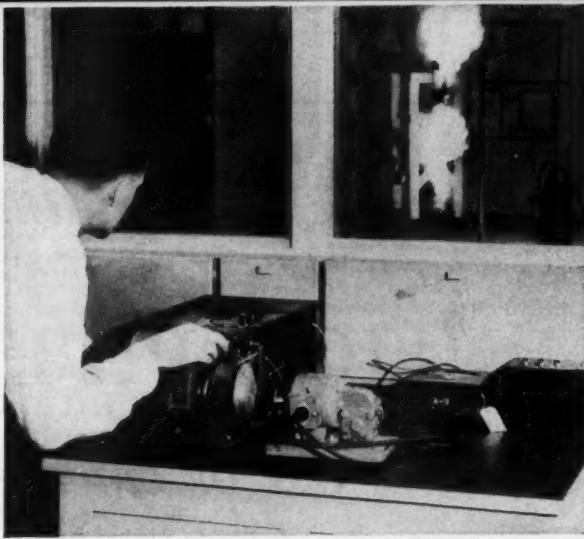
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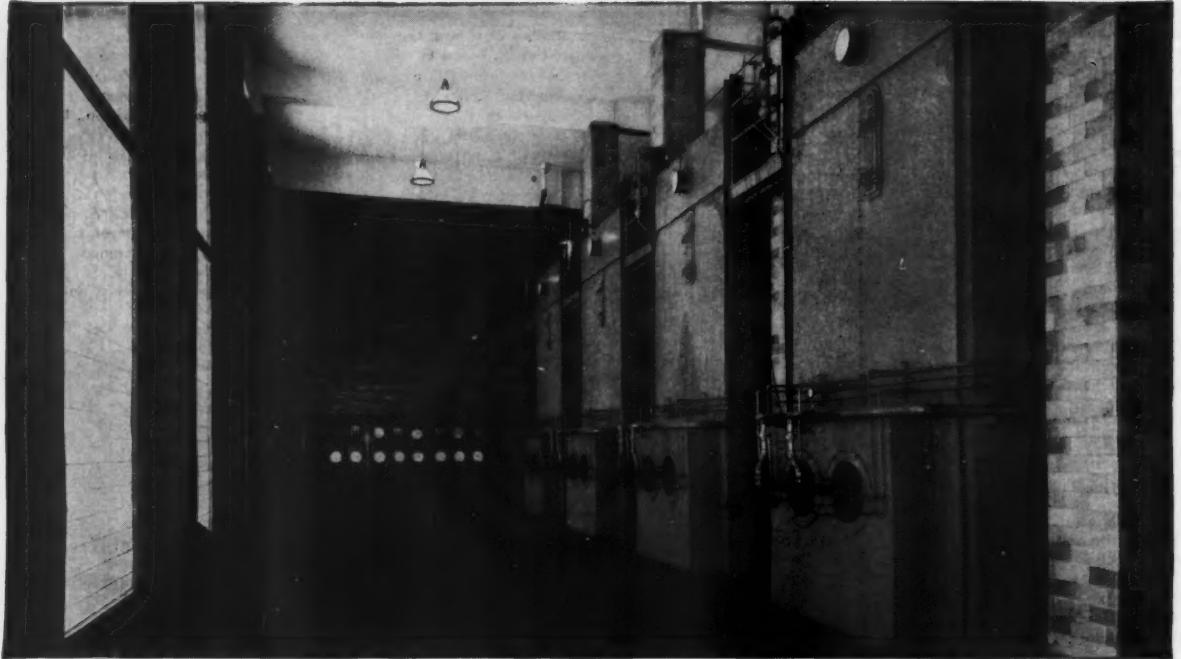
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(3) Utilizes all digester liquor overflow to advantage in the main treatment process.

Using this system, sludge produced in the activated sludge process settles more readily to give better overall results in purification or allows reduction in capacity of secondary settling facilities. Another problem is effectively overcome by making use of digester liquor to good advantage.

The highly nitrified sludge from the aeration tanks set aside for the nitrification process may be returned continuously to the normal activated sludge process or may be returned in amounts required to balance shock loads or organic matter introduced into the aeration tanks.

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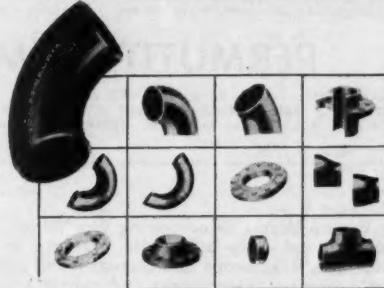
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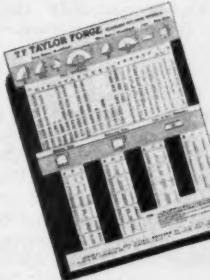
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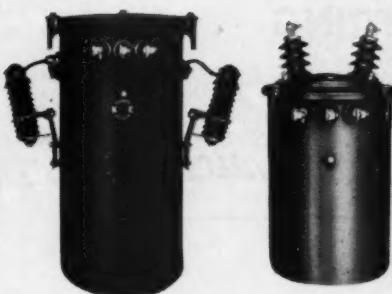
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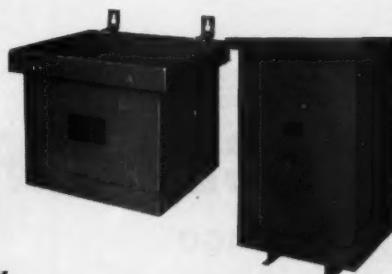
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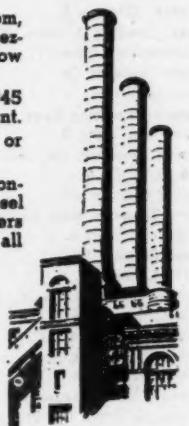
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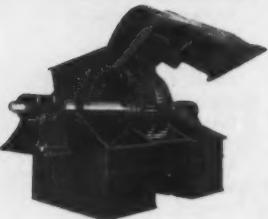
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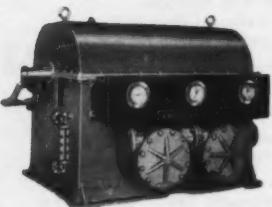
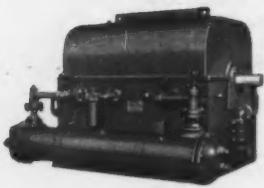


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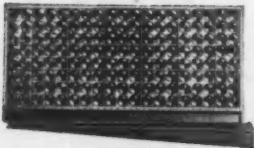
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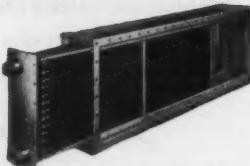
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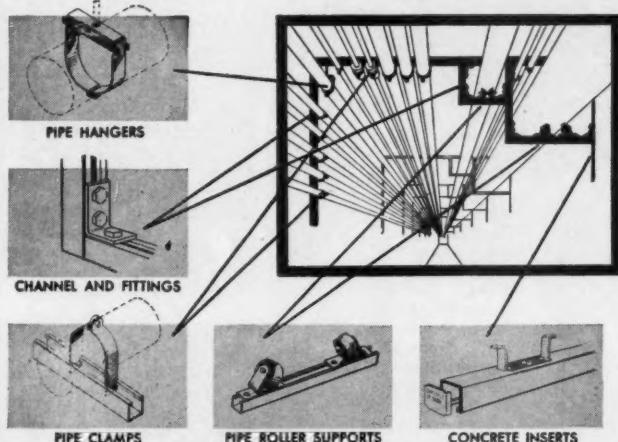
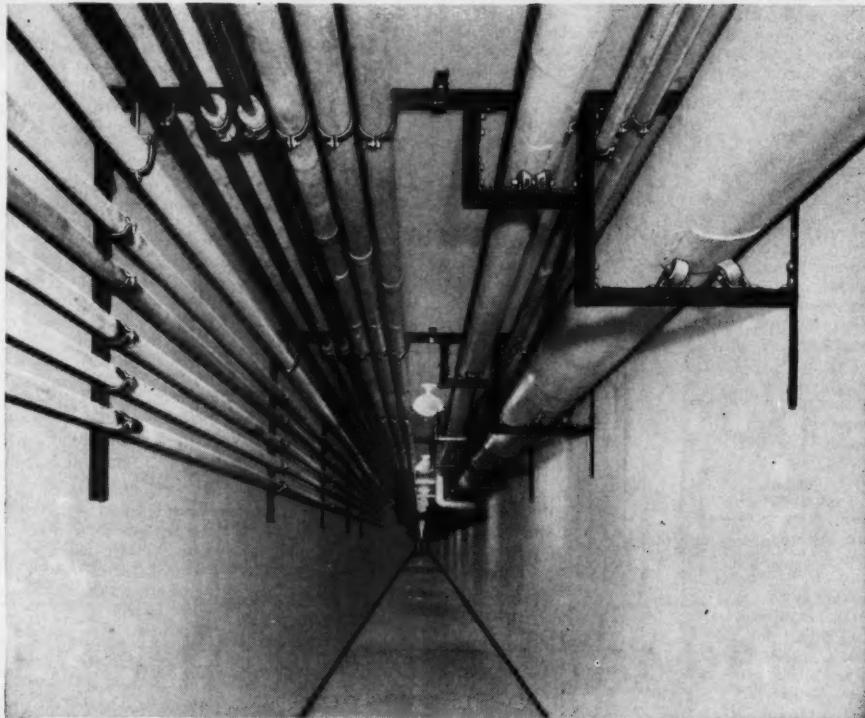


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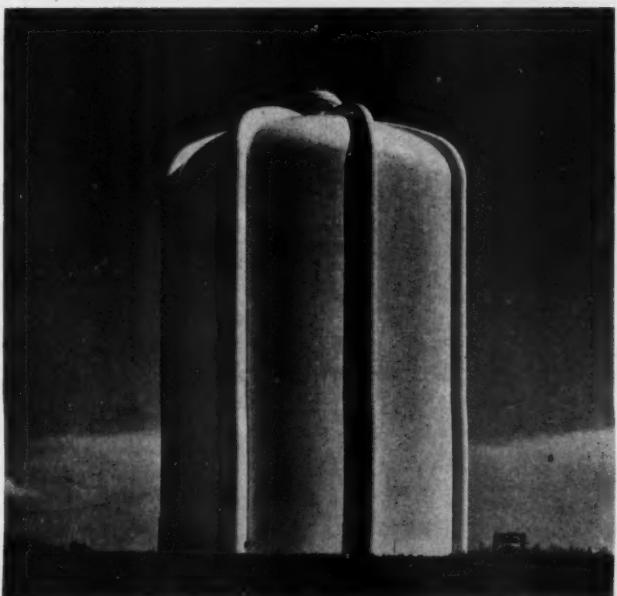
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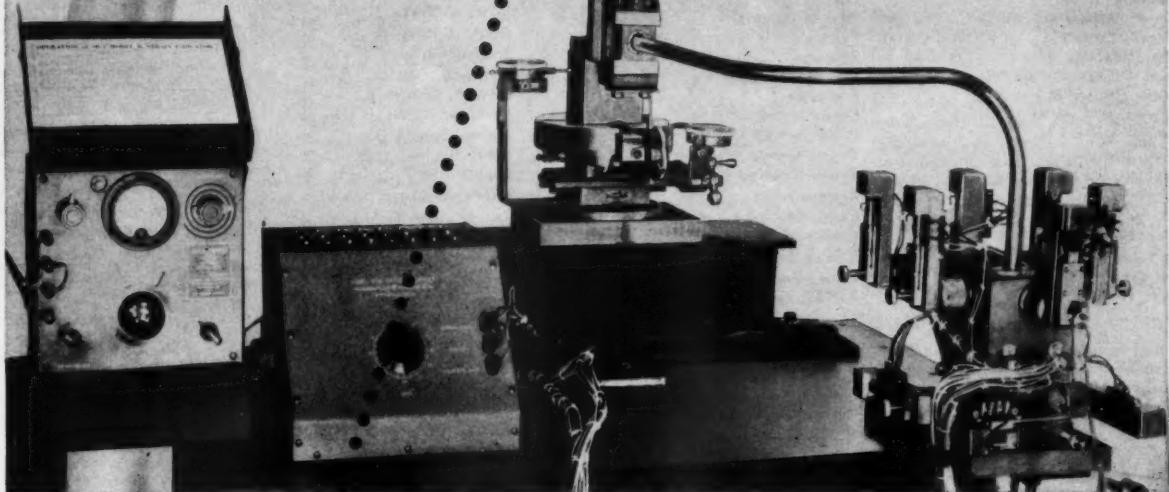
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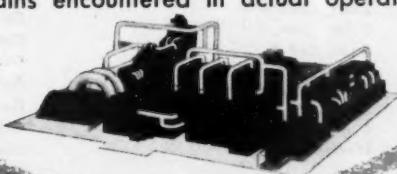
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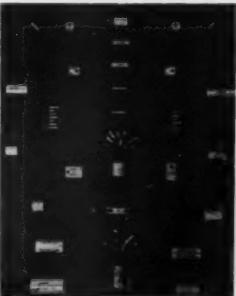
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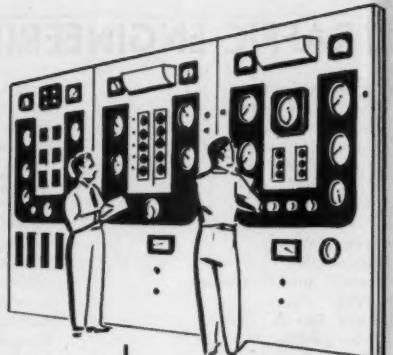
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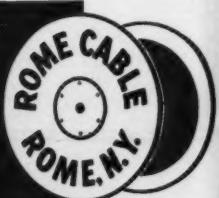
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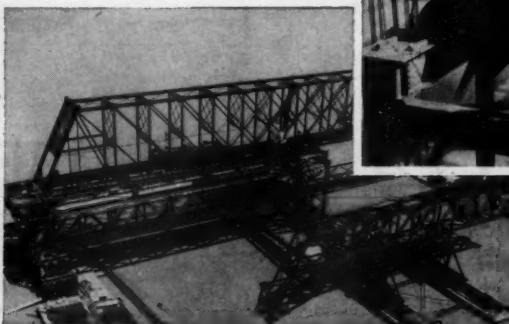
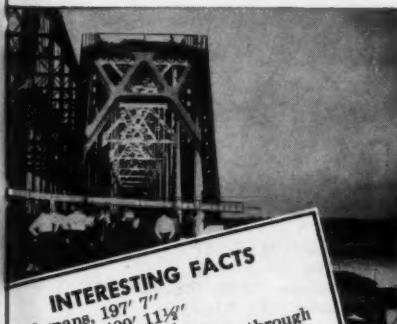
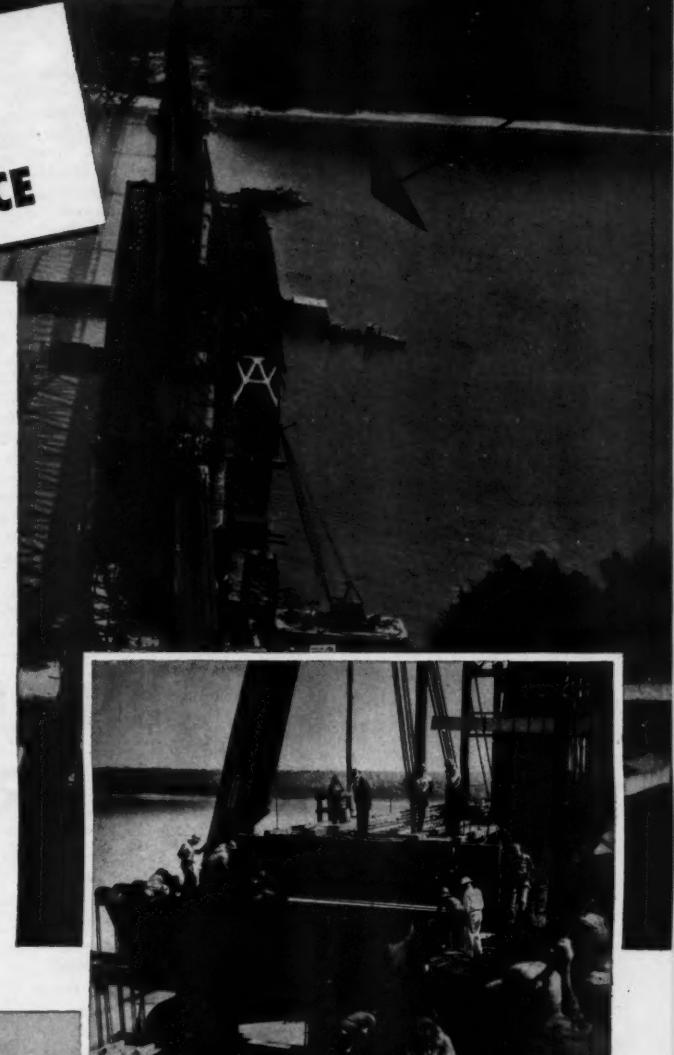
- This is the 100th anniversary of one of America's great railroads—the Illinois Central.

The year 1951 will also see the completion of a new steel superstructure for the Illinois Central's bridge over the Ohio River at Cairo, Illinois.

Twelve modern spans will replace a 61 year old, nine span structure, to accommodate today's heavier, faster traffic. American Bridge Company, because of its skill, know-how and wide experience, was the logical choice to perform the major construction feat of building the new superstructure on the original piers with a minimum interruption in traffic.

The first old span of the bridge was rolled off its piers onto temporary falsework and the new 518-foot, 1,700-ton span moved into position and opened to service after a traffic interruption of only 20 hours! Then the old span was launched like a ship into the river 100 feet below for easy removal.

While this is the first time this procedure has been used on a job of such magnitude, it is a typical example of the part American Bridge Company is playing to help our vital railroad systems meet the needs of growing America.



INTERESTING FACTS

- 6 spans, 19' 7"
- 4 spans, 400' 11 1/4"
- 2 spans, 518' 11"
- Bridge was single track, through truss. Steel used, 10,000 tons.
- Erecting procedure: Illinois Central R. R. and American Bridge Company.
- Consulting Engineers: Modjeski and Masters.

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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

FOOT BY FOOT the old span, 60-ft. high and weighing 1,100 tons, is rolled over to rest on launching sleds atop temporary falsework. From this position it was launched into the Ohio 100 ft. below.
LEFT: Falsework span No. 2 erected complete and jacked to elevation prior to floating. **FAR LEFT:** New span rolls into position four hours after movement started.

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Charles Paine.....	6-13-70 to 6- 7-3	William H. Finley.....	1- 7-02 to 1- 6-03	Rufus W. Putnam.....	6- 1-27 to 6- 6-28
E. S. Chesbrough.....	6- 9-73 to 6-19-77	Ralph Modjeski.....	1- 6-03 to 1- 5-04	John A. Garcia.....	6- 6-28 to 6- 5-29
Wm. Sooy Smith.....	6-19-77 to 8- 3-80	H. W. Parkhurst.....	1- 5-04 to 1- 3-05	William S. Monroe.....	6- 5-29 to 6- 1-30
E. S. Chesbrough.....	8- 3-80 to 1- 2-82	Edward C. Carter.....	1- 3-05 to 1- 2-06	W. O. Kurtz.....	6- 1-31 to 6- 1-31
Willard S. Pope.....	1- 2-82 to 1- 8-83	Bion J. Arnold.....	1- 2-06 to 1- 8-07	Frank D. Chase.....	6- 1-31 to 6- 1-32
DeWitt C. Creiger.....	1- 9-83 to 1- 6-85	W. L. Abbott.....	1- 7-08 to 1- 5-09	D. J. Brumley.....	6- 1-32 to 6- 1-33
Benezette Williams.....	1- 6-85 to 1- 5-86	C. F. Loweth.....	1- 7-08 to 1- 5-09	Harry B. Gear.....	6- 1-33 to 8- 1-34
A. W. Wright.....	1- 5-86 to 1- 4-87	Andrews Allen.....	1- 5-09 to 1-12-10	Charles C. Whittier.....	8- 1-34 to 8- 1-35
S. G. Artingstall.....	1- 4-87 to 1- 3-88	J. W. Alvord.....	1-12-10 to 1-11-11	Frank F. Fowle.....	8- 1-35 to 8- 1-36
A. Gottlieb.....	1- 3-88 to 1- 8-89	O. P. Chamberlain.....	1-11-11 to 1-10-12	J. R. Van Pelt.....	8- 1-36 to 8- 1-37
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Robert W. Hunt.....	1- 4-93 to 1- 3-94	Wm. B. Jackson.....	1-13-15 to 1-12-16	E. Gordon Fox.....	6- 1-40 to 6- 1-41
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Onward Bates.....	1- 3-99 to 1- 2-08	C. H. MacDowell.....	6- 1-21 to 6- 7-22	Titus G. Le Clair.....	6- 1-46 to 6- 1-47
Ambrose V. Powell.....	1- 2-00 to 1- 8-01	J. L. Hecht.....	6- 7-22 to 6- 6-23	W. V. Kahler.....	6- 1-47 to 6- 1-48
Names of deceased Past Presidents are in light type.		C. A. Morse.....	6- 6-23 to 6- 4-24	Verne O. McClurg.....	6- 1-48 to 6- 1-49
		E. T. Howson.....	6- 4-24 to 6- 3-25	Gustav Egloff.....	6- 1-49 to 6- 1-50
		Homer E. Niess.....	6- 3-25 to 6- 2-26	H. P. Sedwick.....	6- 1-50 to 6- 1-51

DECEASED HONORARY MEMBERS

Name	Date Elected				
L. P. Moorhouse.....	12- 7-87	Onward Bates.....	3-22-22	John W. Alvord.....	4-28-31
Octave Chanute.....	1- 5-09	Robert W. Hunt.....	3-22-22	C. F. Loweth.....	4-28-31
Grenville M. Dodge.....	5-20-09	Samuel Insull.....	6- 2-26	John F. Stevens.....	10-29-35
D. J. Whittemore.....	12- 6-10	Ralph Modjeski.....	6- 2-26	Benjamin F. Affleck.....	9-26-38
Geo. W. Goethals.....	1-22-15	Bion J. Arnold.....	6- 1-27	George Terry Horton.....	1- 7-44
John E. Blunt.....	1-10-17	Arthur N. Talbot.....	6- 1-27	Daniel Webster Mead.....	1- 7-44
Alonzo W. Paige.....	1-10-17	E. C. Carter.....	6- 5-29	William Lamont Abbott.....	4-28-31

DECEASED MEMBERS

The following deaths have been reported since the publication of the last Year Book supplement. This shows the date the member joined, his grade at the time of death and the date he died:

Chas. F. Franson ('89,L.M), April '47
 Harry H. Hadsall ('99,L.M), 11-16-49
 Chester L. Post ('19,L.M), 8-21-50
 Clarence C. W. Arnold ('36-'39; '47), Sept. '50
 John E. Flanagan ('36), 10-7-50
 R. A. Whitney ('27), 10-31-50
 J. N. Thoren ('20,L.M), 11-12-50
 G. F. Hedberg ('20,L.M), 11-15-50
 Frederick W. Shaw ('20), 11-15-50
 Charles C. Whittier ('03,L.M), December '50.

Robert R. Brunke ('48), 12-2-50
 Frank A. Randall ('05,L.M), 12-2-50
 E. H. Bangs ('11,L.M), 12-3-50
 Robert J. Bushnell ('M'47), 12-5-50
 W. H. Bettie ('20,L.M), 12-17-50
 J. Hall Taylor ('20,L.M), 2-13-51
 William L. Abbott ('01,H.M), 2-20-51
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 John P. Ball ('03-'11, '23,L.M), 4-23-51
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 Herbert W. Kelly ('50), 4-25-51
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 A. R. Mitchell ('20,L.M), 6-30-51
 Carl O. Mueller ('48), 7-1-51
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 Arthur L. Webster ('12-'32, '42,L.M), 7-8-51
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 Raymond L. Lewis ('46), 8-19-51
 Frank V. Carroll ('49), 8-25-51
 Walter A. Shaw ('38,L.M), 9-2-51
 C. B. Stewart ('90,L.M), 9-2-51
 H. L. Woolhiser ('20,L.M), 10-7-51
 D. E. Wageck ('50), 10-14-51
 Reuben F. Peterson ('48), 11-10-51
 Knuth, Edwin C. ('19,L.M), 11-21-51
 Young, Hugh E. ('19,L.M), 11-28-51
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6- 6-28	Alien, Andrews	1909–10	1907–08	1906–07		1921–24	
6- 5-29	Alien, E. W.					1902–05	
6- 1-30	Alvord, J. W.	1910–11	1908–09			1938–43	
6- 1-31	Andrew, C. R.						1894–95
6- 1-32	Appleton, Thos.	1912–13	1911–12			1907–10	
6- 1-33	Armstrong, W. C.					1934–36	
6- 1-34	Arn, W. G.	1906–07				1900–03	
6- 1-35	Arnold, B. J.	1887–88				1886–88	
6- 1-36	Arlingstall, S. G.					1906	
6- 1-37	Bainbridge, F. H.					1914–17	
6- 1-38	Baker, H. S.						
6- 1-39	Baker, Ira O.			1887–88	1911–12		
6- 1-40	Baldwin, A. S.	1919–20			1918–19		
6- 1-41	Barnes, D. L.				1894–96		
6- 1-42	Bates, Onward	1899–00					
6- 1-43	Bates, W. S.				1888–89		
6- 1-44	Becker, Donald N.	1951–	1950–51	1910–11		1948–50	1944–46
6- 1-45	Bement, A.		1912–14				
6- 1-46	Bennett, J. Gardner		1939–40	1938–39	1937–38		
6- 1-47	Bernhard, Leroy F.						1949–
6- 1-48	Blake, Edw. J.		1900–01				
6- 1-49	Booth, K. F.			1882–83			
6- 1-50	Boyzen, Albert F.			1902–03	1905–06		1951–
6- 1-51	Breckenridge, L. P.						
	Brill, G. M.						1909–12
	Brumley, D. J.	1932–33	1931–32	1928–29	1927–28		
			1929–30				
	Brunner, John					1906–09	
	Burdick, C. B.	1918–19					
	Burt, H. J.	1917–18		1915–16			
	Bushman, A. K.			1916–17			
	Carpenter, Horace			1944–45			1941–44
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		1880–82					
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0-29-35	Cleveland, H. W. S.					1869–74*	
9-26-38	Condron, T. L.					1874–75*	
1- 7-44	Cooley, L. E.	1890–92	1887–88				
1- 7-44	Copeland, F. K.	1920–21	1919–20				1888–89
4-28-31	Correll, E. L.	1889–90					
	Cosley, H. H.						
	Cregier, D. C.	1883–85	1882–83	1880–82			1933–35
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	Curtis, W. W.						1935–37
	Dailey, John A.						1910–13
	Dalstrom, O. F.						1922–25
	Dart, C. R.			1911–12		1913–20	1917–20
	Davidson, F. E.						1913–16
	DeBerard, W. W.						1918–20
	De Leuw, C. E.				1917–18		1947–50
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	Elfstrom, P. R.	1944–45	1943–44	1942–43		1938–42	
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	Felt, C. F. W.		1920–21				
	Field, H. H.						1931–33
	Finley, Wm. H.	1902–03	1901–02	1900–01			
	FitzSimmons, Chas.						
	Fowle, F. F.	1935–36	1922–23	1921–22		1880–87	1889–92
	Fowler, M. M.						
	Fox, E. Gordon	1940–41		1939–40	1938–39		
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							1875–78*

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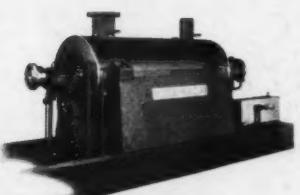
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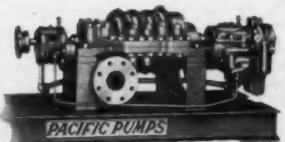
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Gayton, L. D.						1932-34	
Gear, Harry B.	1933-34	1932-33	1930-32				
Gebhardt, G. F.				1914-15			
Gerber, Emil					1896-98		
Glaiver, J. G.						1912-15	
Goldmark, Henry							1896
Gordon, F. G.	1942-43	1941-42	1940-41		1937-38	1934-37	
Goss, W. F. M.				1909-10		1886-89	
Gottlieb, A.	1888-89						
Grant, B. E.	1916-17	1914-15	1901-02			1903-06	
Greeley, S. S.		1883-84				1875-80*	
Green, O. B.						1880-83	
Grinter, L. E.						1888-91	
Hall, Ferd						1950-	
Hand, Geo. W.						1897-00	
Hansen, Paul						1923-28	1928-30
Harger, Kendrick							1943-44
Harper, R. B.							1940-43
Harrington, J. Earl.				1945			1942-45
Hart, G. A.							1949-
Hatch, J. N.		1918-19	1917-18				
Hatt, W. K.					1910-11		
Haupt, C. W.						1934-36	
Hayford, J. F.					1913-14		
Heald, H. T.	1945-46	1944-45	1943-44			1939-42	
Hecht, J. L.	1922-23	1921-22	1920-21	1919-20			
Herr, Hiero	1894-95		1893-94				
Hjortsberg, Max						1869-74*	
Horton, Horace E.	1895-96					1896-99	
Hotchkiss, C. W.			1904-05			1901-04	
Howson, E. T.	1924-25	1923-24			1922-23		1919-22
Howson, A. W.							1950-
Howson, L. R.	1937-38	1936-37	1935-36	1933-35			
Hudson, C. H.			1886-87				
Hunt, Robert W.	1893-94					1894-97	
Huntington, W. C.							1936-39
Imhoff, Eldon A.							1947-50
Jackson, Dugald C.					1906-07		
Jackson, Wm. B.	1915-16						
Johnson, Thos. T.	1897-98	1896-97	1895-96				
Junkersfeld, Peter			1909-10	1908-09			
Kahler, W. V.	1947-48	1946-47	1945-46			1944-45	
Keith, Leigh S.		1934-35	1933-34	1932-33	1928-32		1935-47
Kinney, Wm. M.				1918-19			
Knowles, C. R.				1934-35			
Kurtz, W. O.	1930-31		1929-30	1928-29			
Lane, F. H.	1941-42	1940-41		1939-40		1936-39	
Lane, Moses			1880-82				
Layfield, E. N.				1907-08			1915-17
LeClair, Titus G.	1946-47	1945-46				1942-45	1937-40
Lee, E. H.	1914-15						
Lenth, Geo. C. D.							1916-19
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Litten, Nelson L.							1896-01
Lowell, J. W.							
Loweth, C. F.	1908-09		1905-06				
McClure, R. J.							1880-87
McClurg, V. O.	1948-49	1947-48	1946-47				1942-45
McCullough, Ernest			1915-16	1914-15			1911-14
McElroy, Samuel							1916
McHarg, W. S.				1885-86			
MacDowell, C. H.			1889-90				1882-85
Macomb, J. deN.				1889-90			
MacRitchie, Chas.							1946-49
Mapes, L. R.	1939-40	1938-39	1937-38	1936-37			
Marston, W. R.						1933-36	
Mason, Roswell B.	1869-70						1951-
Massey, Geo. B.							
Mead, Daniel W.			1894-95		1908-09		
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Miller, K. B.			1919				

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Morison, Geo. S.						1893-96	
Morrow, F. E.	1926-27	1925-26	1924-25				
Morse, C. A.	1923-24		1922-23				
Nagler, K. B.						1935-38	
Nethercut, Edgar S.							1917-35
Newell, F. H.					1916-17		
Nichols, Geo. P.						1898-01	
Niesz, Homer E.	1925-26	1924-25			1921-23		
Noble, Alfred	1898-99	1897-98	1896-97				
Northway, W. R.			1890-91				
Nourse, Edwin G.					1893-94		
Nutt, H. C.						1880-82	
Osborn, C. M.					1936-37		
Paine, Charles	1870-73						
Parkhurst, H. W.	1904-05	1903-04			1889-90		
Penn, Henry						1946-49	
Pence, W. D.					1904-05		
Pope, Willard S.	1882-83						
Powell, Ambrose V.	1900-01		1898-99		1887-88		
Putnam, Rufus W.	1927-28	1926-27	1925-26	1924-25			
Randall, Frank A.						1935-38	
Randolph, Isham	1892-93	1884-85	1883-84				
Reichmann, Albert	1913-14				1906-13		
Reynolds, James J.		1898-99	1897-98			1901	
Rich, E. P.						1926-29	
Ritter, L. E.						1934-35	
Roney, Chas. J.						1908-11	
Roper, D. W.		1916-18	1916				1895-96
Rust, H. A.		1893-94				1887-90	
Sedwick, H. P.	1950-51	1949-50	1948-49			1945-47	
Seely, G. T.			1912-13				
Seymour, W. O.			1891-92				
Shaler, Robert A.		1890-91					
Shankland, F. C.					1912-13		
Shapiro, B. B.					1921-22		
Skog, Ludwig						1949-	
Smith, Homer K.						1945-48	
Smith, W. Sooy.						1883-86	
Snow, T. W.	1877-80					1904-07	
Steger, Donald V.							1947-49
Strasser, R. J.						1937-40	
Strobel, C. L.						1892-95	
Sullivan, John F., Jr.					1950-		
Sykes, Wilfred						1948-51	
Talbot, A. N.					1907-08		
Townsend, H. C.						1943-46	
Turneaure, F. E.			1903-04				
Turner, Ralph E.						1945-48	
VanPelt, J. R.	1936-37	1935-36				1934-35	
Vore, M. P., Jr.					1948		
Wallace, John F.	1896-97	1891-92					
Warder, J. H.							1901-15
Webb, C. Earl	1943-44	1942-43	1941-42			1940-41	
Westburg, Paul A.	1938-39	1937-38	1936-37	1935-36	1932-34		
Weston, C. V.						1929-32	
Weston, John W.		1888-89			1890-93		1889-94
White, Linn					1920-21		
Whiting, F. T.						1948-51	
Whitney, Nelson O.		1899-00					
Whitridge, John C.					1902		
Whittemore, D. J.			1886-87				
Whittier, C. C.	1934-35	1933-34	1932-33	1930-32		1927-30	
Williams, Benetze	1885-86					1878-80*	
Wisner, G. M.						1905-08	
Witt, J. C.			1949-50				
Woodworth, P. B.					1915-16		
Wright, Augustine W.	1886-87		1884-85			1885-86	
Young, Hugh E.						1941-44	
Ziesing, August						1899-02	

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● The illustration above shows the first 100,000 KW unit of a plant which is to be extended into a 200,000 KW station. All coal handling equipment including the receiving and reclaiming hoppers and grillage, duplex feeder, conveyors, galleries, breaker screen and all supporting structures were fabricated in our shops, and installed by us, to Sargent and Lundy's specifications. For maximum efficiency and fixed unit responsibility, let the Bartlett-Snow coal handling engineers, with their long experience and complete facilities, work with you on your next job.



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Central Illinois Public Service Co.
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Handling Coal from Track Hopper



Drive for Collector Belt Under Breaker
The Refuse Belt and Automatic Sampler

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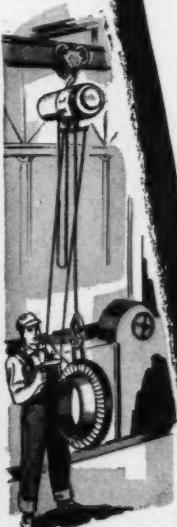


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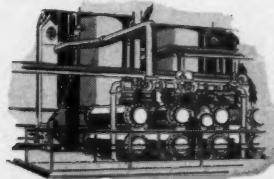
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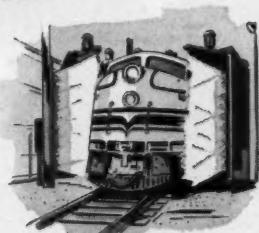
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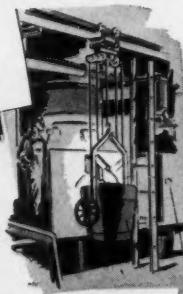
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Reduce overhaul and maintenance costs.

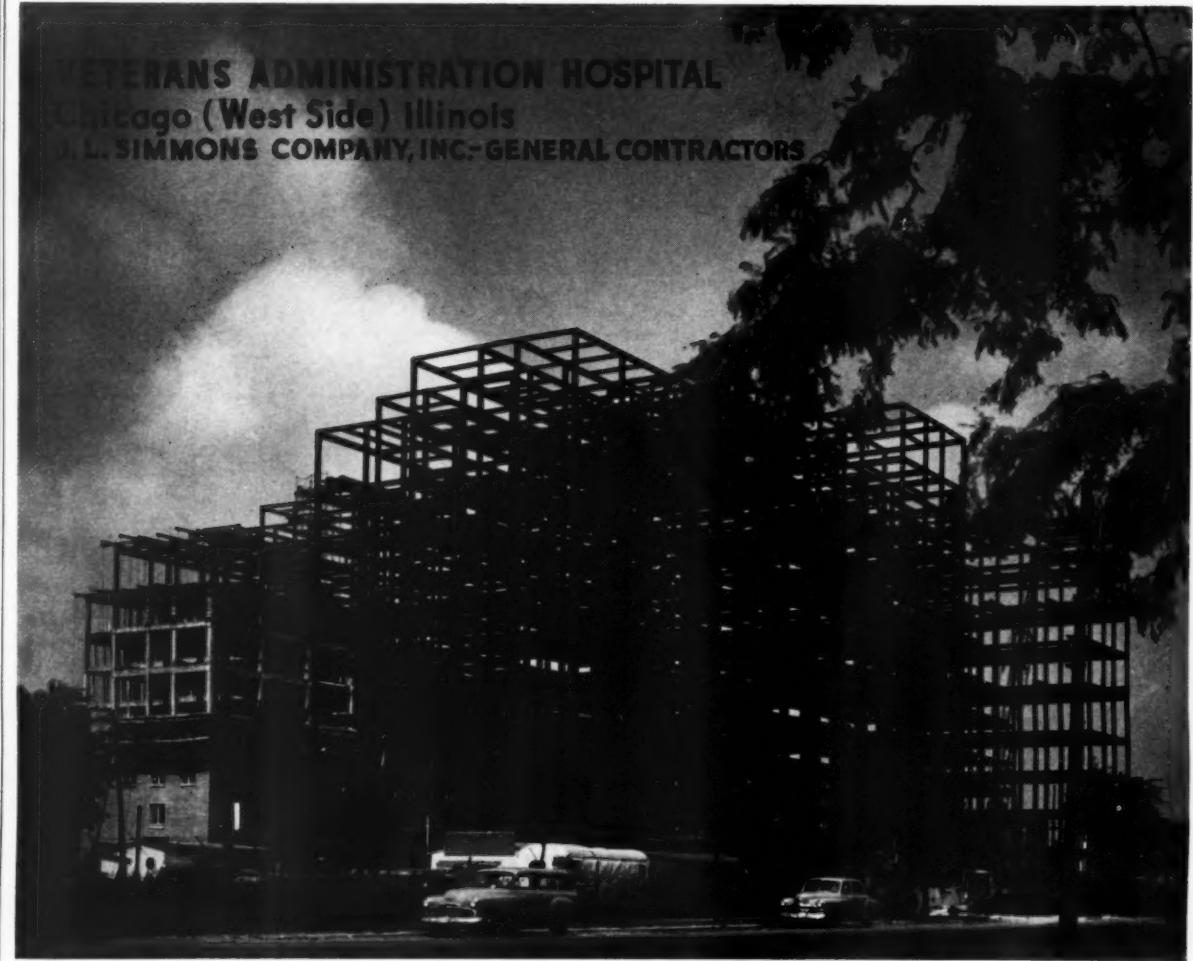


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